SWIFT Customer Security Controls Framework v2021

Customer Security Programme

Detailed Description

This document establishes a set of mandatory and advisory security controls for the operating environment of SWIFT users. Mandatory security controls build on existing guidance and establish a security baseline for the entire user community. Advisory controls are optional good practices that SWIFT recommends each user implement in their operating environment. This document has to be read in conjunction with the CSP FAQ SWIFT Knowledge Base TIP 5021823 which provides additional valuable information.

01 July 2020

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Executive Summary

The cyber threat facing the financial sector has never been greater. There has been a continued evolution since 2016, with SWIFT users facing attacks of increasing levels of sophistication. Modus operandi, the Tactics, Techniques and Procedures (TTPs) have progressed and changed as institutions strengthen security measures. The persistence of such threats underlines the importance of remaining vigilant and proactive in the long term. While customers are responsible for protecting their own environments and access to SWIFT, the Customer Security Programme (CSP) has been introduced to support customers and drive industry-wide collaboration in the fight against cyber fraud. The CSP establishes a common set of security controls known as the Customer Security Controls Framework (CSCF) which is designed to help customers to secure their local environments and to foster a more secure financial ecosystem.

The SWIFT Customer Security Controls Framework (CSCF) consists of both mandatory and advisory security controls for SWIFT users. Mandatory security controls establish a security baseline for the entire community, and must be implemented by all users on their local SWIFT infrastructure. SWIFT has chosen to prioritise these mandatory controls to set a realistic goal for near-term, tangible security gain and risk reduction. Advisory controls are based on good practice that SWIFT recommends users to implement. Over time, mandatory controls may change due to the evolving threat landscape, and some advisory controls may become mandatory.

All controls are articulated around three overarching objectives: 'secure your environment', 'know and limit access', and 'detect and respond'. The controls have been developed based on SWIFT's analysis of cyber threat intelligence and in conjunction with industry experts and users feedback. The control definitions are also intended to be in line with existing information security industry standards.

The controls outlined in this document represent general product-agnostic controls. They should not be considered exhaustive or all-inclusive, and do not replace a well-structured security and risk framework that covers the whole end-to-end transaction chain, sound judgment, or compliance with the latest best security practices.

Given the evolving nature of cyber threats, the introduction of new technologies and updated SWIFT strategic initiatives, controls will be regularly assessed, refined and expanded with the changes published in a new version of this document. Consequently, it is recommended to always use the latest version of this document located in the SWIFT Knowledge Centre.

To support adoption of the controls, SWIFT has developed a process that requires users to attest compliance against the mandatory and, optionally, the advisory security controls. Users are asked to submit an attestation into the KYC Security Attestation application (KYC-SA). By the end of each year, users must attest compliance against the mandatory and, optionally, the advisory security controls as documented in the CSCF in effect at that time. A new version of the CSCF is typically published in early July listing the mandatory and advisory controls users need to attest against as from July of the following year when implemented in the KYC-SA. To illustrate, users must attest between July and December 2021 against the security controls listed in the CSCF v2021 published mid-2020.

As previously communicated to the SWIFT community, we have re-phased originally published timelines for the CSCF to make sure upcoming reinforcements are practical for our community. Users will need to re-attest against CSCF v2019 by the end of 2020. Controls previously articulated in CSCF v2020 are rolled into CSCF v2021, and users will need to attest against that framework in the second half of 2021.

Each user retains control over their own data and is able to grant access to allow their counterparties to view their attestation data. This fosters transparency, and creates peer-driven momentum to improve security by allowing other users on the network to apply risk-based decision-making concerning their business relationships. For more information about the attestation and reporting process, see the latest version of the *SWIFT Customer Security Controls Policy* found in the Knowledge Centre.

The CSP is designed to be a collaborative effort between SWIFT and its users to strengthen the overall security of the financial ecosystem. All users must therefore read the controls set out in this document carefully, and prepare accordingly their own organisation for implementation.

Overview of changes

The SWIFT Customer Security Controls Framework version 2021 builds incrementally on last year's version – CSCF v2020. Changes have been kept to a minimum compare to CSCF v2020 to ensure the community has ample time to fully implement the controls from previous CSCF versions.

On paper, CSCF v2021 'promotes' one control to mandatory. However, in practice, control '1.4 - Restrict Internet Access', was already part of mandatory control '1.1 - Environment Protection / Network Segregation' since the launch of the original controls in 2017.

In addition, a number of guidelines and scope definitions (mainly for 'connectors') have been clarified to better support attestations and assessments. Also, a new architecture type, identified as A4, which copes with non-SWIFT footprint, has been introduced. Its introduction gradually supports technology usage resulting from SWIFT's strategy (such as Cloud and API's) and paves the way for the future, albeit initially in an advisory way.

Further clarifications have been made in order to help users implement the framework as intended and highlight expectations on the usual initial cyber targets: the general operator PCs connecting to local or remote infrastructure.

Some user suggested implementations have also been incorporated (see controls 1.1; 2.9A; 6.1; 6.5A and 7.4).

To enhance efficiency and ensure continuous identification of components in the controls' scope, an initial list is proposed in Appendix F. This list will be regularly updated on-line.

Finally, to further ease independent assessments, users are reminded that:

- Compliance to control objectives is a risk-based approach. The provided implementation guidelines can be used as a starting point but cannot be considered as strict 'audit checklists',
- Users engaging with third parties (extended to cloud providers) to host and/or operate in full or in part their own SWIFT infrastructure, have to obtain reasonable comfort from third parties that the outsourced activities and/or externally hosted components are protected as per the security controls. As an example, Appendix G presents the shared responsibilities when going for an Infrastructure as a Service (IaaS) model in the cloud.

The following table summarises the most significant changes to the content of this document compared to the previous version. The table does not include editorial changes that SWIFT makes to improve the usability and comprehension of the document. It is always suggested to consult the "CSCF v2021 compared to v2020" version of this document to view the full detail of all changes.

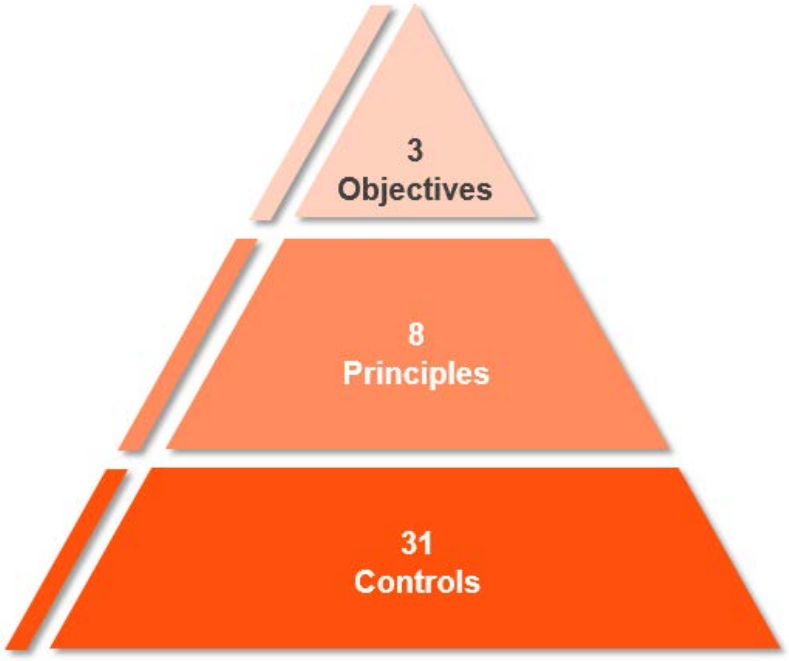
Control or section	Change
Confirm split of existing controls for efficiency	
Further strip down control 1.1 by transferring Restriction of Internet Access to the control 1.4	Centralise in control 1.4 the guidance related to internet access and removed the latter from 1.1 d) and e)
Clarifications on scope definitions and new architecture - Alignment to reality and new models	
Connector definition	Embed middleware/MQ servers and API end points when used to connect or transmit transactions to service providers or SWIFT Differentiate SWIFT related connectors (such as SIL, DirectLink, AutoCLient, MicroGateway) from customer connectors (based on file servers, middleware/MQ servers or custom-made API end points)
General Purpose Operator PCs	Clarified that accessed infrastructures or

Control or section	Change
	applications can be locally or externally hosted/operated. Explicit reference to general purpose operator PC in the relevant controls and clarifications to support appropriate implementation when it matters
Third party	Extended to cloud provider. It is reminded that when engaging with a third party, users remain responsible for securing their infrastructure and have to obtain reasonable comfort from third parties that the outsourced activities and/or externally hosted components are protected as per the CSP security controls. Appendix G added to illustrate when outsourcing using an IaaS model
Architecture Types – Architecture A4	A new Architecture Type is introduced to differentiate users relying on SWIFT related connectors (or SWIFT footprint), currently designated as A3, from those relying on customer connectors (no SWIFT footprint), new A4. Previous scope extension to middleware/MQ servers and the repositioning of the file server solutions as customer connector might require some existing B or A3 architectures to become A4
Security Controls Compliance – Support of the independent assessments	
Security Controls Compliance and on each control	It is reminded that implementation guidelines are not strict audit check lists but are to be assessed using a risk based approach
Clarifications to existing controls for efficiency and alignment to reality	
1.1 SWIFT Environment Protection	Inclusion of temporary access as a potential alternative to different jump servers for users and admin connection to secure zone
1.3 Virtualisation Platform Protection and related controls	Explicit reference to remote (externally hosted or operated) virtualisation platform to foster attention when engaging with a third party or moving to the cloud
2.4A Back Office Data Flow Security and related controls	Newly introduced customer connectors treated similarly to the local middleware/MQ servers: in-scope extension for some controls (advisory when used)
2.7 Vulnerability Scanning	Advisory for architecture B (i.e. only an optional enhancement for general purpose operator PCs)
2.8A Critical Activity Outsourcing	Reminds the user responsibility when engaging with a third party or a service provider
2.9A Transaction Business Controls	24/7 operational environment taken into account and suggested implementation methods reorganised; also clarified the outbound focus of this control
2.10 Application Hardening	Interfaces are now governed by the renamed SWIFT Compatible Interface Programme
4.2 Multi-factor Authentication	MFA is also expected when accessing a SWIFT-related service or application

Control or section	Change
	operated by a third party
5.2 Tokens Management	Reference to personal tokens and clarifications about how to properly establish and manage the connections to the remote PED when used
5.4 Physical and Logical Password Storage	Safe certifications are referred to, as an optional enhancement
6.1 Malware Protection	Reference to Endpoint Protection Platform (EPP) usage as a potential alternative implementation and explicit request to act upon results; added clarification regarding the scanning
6.2 Software Integrity	Explicit request to act upon results
6.3 Database Integrity	Explicit request to act upon results. Caveat introduced to cater for the rare architecture A1 instances that do not include a messaging interface
6.5A Intrusion Detection	Reference to Endpoint Detection and Response (EDR) usage as potential alternative implementation
7.3A Penetration Testing	Clarifications on (i) the scope supported by the related FAQ and (ii) typical significant changes
7.4A Scenario Risk Assessment	Reference to cyber wargames
Appendix A-E	Kept up to date
Appendix F	Introduced to support the identification of elements in-scope and their usual related architecture type. This information is valid at the time of publication of this document
Appendix G	Introduced to illustrate shared responsibilities in a specific IaaS cloud model

Framework Objectives and Principles

Objectives and Principles



The security controls are based upon three overarching framework objectives, supported by eight security principles. Objectives are the highest level structure for security within the user's local environment. The associated principles elaborate on the highest priority focus areas within each objective. The objectives and corresponding principles include:

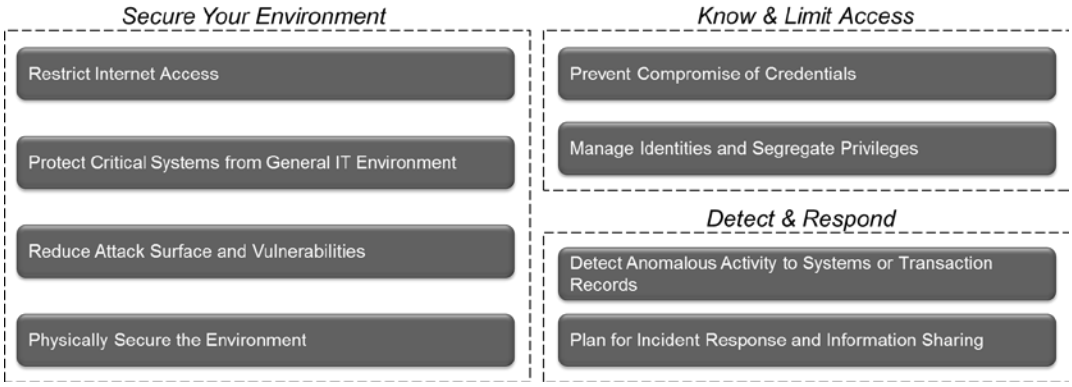


Figure 1: Framework Objectives and Principles

The 31 security controls (22 mandatory and 9 advisory controls) detailed in this document underpin these objectives and principles. The controls help to mitigate specific cybersecurity risks that SWIFT users face due to the cyber threat landscape. Within each security control, SWIFT has documented the most common risk drivers that the control is designed to help mitigate. Addressing these risks aims to prevent or minimise undesirable and potentially fraudulent business consequences, such as:

- Unauthorised sending or modification of financial transactions
- Processing of altered or unauthorised SWIFT inbound (i.e. received) transactions
- Business conducted with an unauthorised counterparty
- Confidentiality breach (of business data, computer systems, or operator details)
- Integrity breach (of business data, computer systems, or operator details)

Ultimately, these consequences represent enterprise level risks, including:

- Financial Risk
- Legal Risk
- Regulatory Risk
- Reputational Risk

Integration with Security Governance and Risk Management

SWIFT encourages users to consider cyber risk management in the broadest possible terms, including beyond the scope of the user's SWIFT infrastructure and the SWIFT security controls. For the most effective management of risk, users should not view the implementation of these security controls as a one-off or one-time activity, nor as exhaustive or all-inclusive. Users should rather incorporate SWIFT's controls into an ongoing cybersecurity governance and risk programme within their organisation that considers sound judgment and the latest best practices, taking into account user-specific infrastructure and configurations. As a result, users can re-use and benefit from existing policies, procedures and controls that have been established to manage other areas of cyber risk. To help users in this approach, the Appendix E presents a mapping of the SWIFT security controls against three international security standard frameworks: NIST Cybersecurity Framework v1.1; ISO 27002 (2013) and PCI-DSS 3.2.1. SWIFT has also published a guiding document to assist SWIFT users in assessing their counterparty cybersecurity risk and incorporating this into their risk management framework.

A holistic approach to cyber risk will be most effective in avoiding enterprise-level risk, thereby improving the overall safety of each individual organisation and the wider financial community.

In addition, users should have the right level of accountability and oversight for their cyber risk management activities. Typically, a Chief Information Security Officer plays a prominent role in this domain by directing the priorities of the security programme and soliciting the appropriate support and guidance from the Board.

Scope of Security Controls

The scope of security controls in this document encompasses a defined set of components in the user's local environment (see Figure 2).

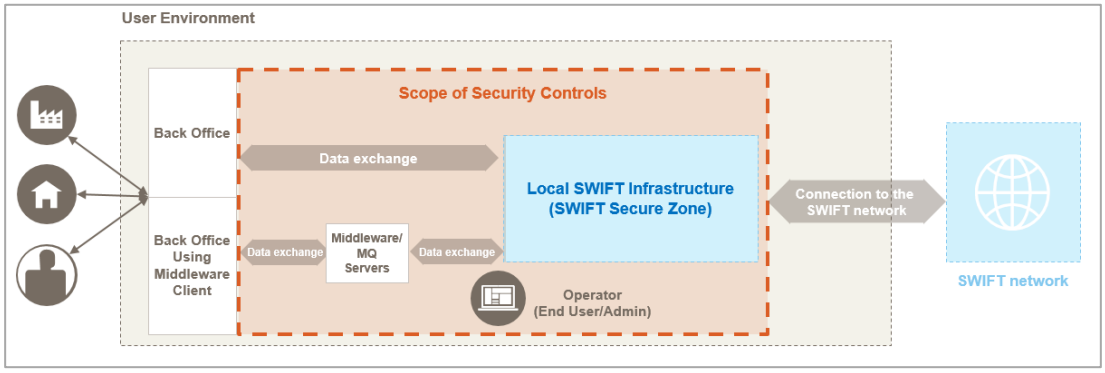


Figure 2: Scope of Security Controls

The security controls apply to the following in-scope components:

- **Local SWIFT infrastructure –** The collection of, on premises or externally hosted, SWIFT-specific components managed by or for users, including applications, network components, tokens and other removable media, and supporting hardware. Examples of local SWIFT infrastructure setup and components, depending on the user architecture type, are:
  - **SWIFT Secure Zone** - segmented zone separating SWIFT-related systems from the wider enterprise (further detailed in control 1.1). This zone may expand beyond the local SWIFT infrastructure and may include non-SWIFT systems.
  - **Messaging Interface** - Messaging Interface software supporting the use of MT, MX, or ISO 20022, message standards through SWIFT FIN, InterAct, FileAct and SWIFTNet Instant messaging services. The software provides the means for users to connect these business applications to SWIFT messaging services and is typically connected directly to the communication interface. Messaging interfaces are provided by SWIFT (for example, Alliance Access and Alliance Messaging Hub or Alliance Messaging Hub Instant). Messaging interfaces holding a SWIFT-compatible label can also be provided by third-party vendors. A Messaging Interface is considered as a SWIFT footprint.
  - **Communication Interface** - Communication Interface software providing a link between the SWIFTNet network and Messaging Interface software. Communication interfaces provide centralised, automated, and high-throughput integration with different in-house financial applications and service-specific interfaces. Communication Interfaces are provided by SWIFT (for example, Alliance Gateway or Alliance Gateway Instant). Communication interfaces holding a SWIFT-compatible label can also be provided by third-party vendors. A communication interface is considered as a SWIFT footprint.
  - **Connector** - Connectors are local software designed to facilitate communication with a messaging and/or a communication interface, or to a service provider. When using a connector, interface components are usually offered by a service provider (for example, by a service bureau, hub infrastructure, or SWIFT).

    The terms, "SWIFT connector" and "customer connector" are defined as:
  - ***SWIFT connector*** is a connector provided by SWIFT (for example, Alliance Cloud SIL, DirectLink, Alliance Lite2 AutoClient, in combination with SIL or not, or MicroGateway). SWIFT connector holding a SWIFT-compatible label can potentially be provided by third-party vendors. A SWIFT connector is considered as a SWIFT footprint.

Customer connector includes generic file transfer solutions or local middleware systems implementations, such as IBM® MQ server, used to facilitate communication with SWIFT related components offered by a service provider. Those generic elements being not provided by SWIFT or not labelled SWIFT-compatible, are considered as non-SWIFT footprint.

In the future, an application implementing SWIFT API's (either using the specifications or integrating the SWIFT SDK) to connect and transmit independently[1] business transactions to SWIFT messaging services[2] exposed by the SWIFT API Gateway, will also be considered as a customer (bespoke API) connector or non-SWIFT footprint.

The term ***connector*** alone refers to both SWIFT and customer connectors.

- **SWIFTNet Link (SNL)** - SNL is a mandatory software product for access to FIN, InterAct and FileAct messaging services over a secure IP network. This document refers to the SNL as part of the Communication Interface scope.
- SWIFT Hardware Security Modules, connected, personal tokens and smart-cards.
- Firewalls, switches, routers, etc. within or surrounding the SWIFT infrastructure (dedicated or shared). Also referred to as network devices.
- **Graphical user interface (GUI)** - Software that produces the graphical interface for a user (for example, Alliance Web Platform Server-Embedded and equivalent products).

- **Operators** - Operators are individual end users and administrators who directly interact with the local SWIFT Infrastructure at the application or OS level.
- **Operator PCs -** These are the end user or administrators' computing device (typically a desktop or laptop) used to conduct their duties: a) use, operate or maintain the local SWIFT infrastructure residing on premises or externally hosted and/or b) use a remote SWIFT infrastructure or application operated by a service provider (such as a service bureau, a Lite2 for Business Application provider or SWIFT), depending on your architecture type.
  - The terms, "general purpose operator PC" and "dedicated operator PC" are defined as:

    A ***general purpose operator PC*** is located in the general enterprise IT environment and used for daily business activities including accessing the local or a remote SWIFT infrastructure or an application operated by a service provider, depending on your architecture type.

    A ***dedicated operator PC*** is located in the secure zone and dedicated to interact with components of the secure zone (sometimes also referred to as an operational console).

    The term ***operator PC*** alone refers to both general purpose and dedicated operators PCs.
- **Data exchange layer –** The transport of data between the SWIFT-related components (in the local SWIFT infrastructure or at a service provider) and a user back office first hop, at application level, as seen from the SWIFT-related components.
- **Middleware server –** Local middleware systems implementations, such as IBM® MQ server (including MQ queues manager, MQ appliance or both), used for data exchange between the SWIFT-related components (in the local SWIFT infrastructure or at a service provider) and the user back office. It has to be considered as a customer connector when used to facilitate communication with SWIFT related components offered by a service provider (such as a service bureau, or potentially a Lite2 for Business Application provider).

[1] Independently means without using a communication interface or a SWIFT connector such as SIL, DirectLink or MicroGateway

[2] Business transactions to messaging services refers to requests introducing or affecting SWIFT payments (such as creation of MT103, 101, 202, 205 or cancelling/stopping/recalling/modifying those requests). On the other side, queries on previous transactions (such as through the Basic Tracker), prevalidation, conversion or screening performed before submitting business transactions are not considered affecting messaging services and can be considered as out of scope unless they require the same roles/entitlements as business transactions to messaging services (no segregation of duties and precautionary principle has to be applied).

The following components are out of scope:

- **User back office -** The systems responsible for business logic, (financial) transaction generation, and other activities occurring before transmission into the local SWIFT infrastructure. For example:
  - Back office implementations such as SAP, General Ledger or applications using an MQ Client to liaise with a SWIFT infrastructure are out of scope unless co-hosted with an in-scope component.
  - An application or system relying on

    a) a communication interface (such as the SAG – see Figure 3b) or

    b) a SWIFT connector (such as Direct Link or MicroGateway – see Figure 5) or

    c) in the future, a customer connector (see Figure 6b)

    for its API calls to SWIFT remains a back office and is out of scope unless co-hosted with the communication interface or the connector.
- **General Enterprise IT environment -** The general IT infrastructure used to support the broad organisation (for example, general purpose PCs, mail server, directory services, etc.).

Connections to the SWIFT network supplied by SWIFT Network Partners, Internet connection to the SWIFT network, and Alliance Connect VPN boxes, or their virtual instances[3], remotely managed by SWIFT are also out of scope. However, Alliance Connect VPN boxes and their virtual instances (hosting systems or machines) are expected to be in an environment with appropriate physical controls in line with the control 3.1.

Although not mandatory for the purposes of the attestation process, the security controls reflect good security practice and it is appropriate to implement them beyond the in-scope environment into the broader end-to-end transaction chain.

Note: Users must attest for all in-scope components in their local live, back-up and disaster recovery environment, taking into account their specific but still comprehensive architecture (declaring the most encompassing architecture type).

As such, test systems are preferably fully segregated from production systems (incl. separate HSMs) and configured to only support test traffic (for example, by only using lite certificates and only configuring test logical terminals). If not fully segregated, these systems must be maintained to the same security level as the production systems.

Development systems are not within the secure zone and are not connected to the SWIFT network.

Note: Users engaging with third parties (for example, an external IT provider or a cloud provider) or service providers (such as a service bureau, or a Lite2 for Business Application provider which, in this specific case, has to be considered as a third party) to host or operate in full or in part the user's SWIFT infrastructure :

- Are still responsible and accountable to attest for their comprehensive architecture type (as if it was operated on premises) and consequently
- Have to get reasonable comfort[4] from such third parties or service providers that the related activities are protected, at a minimum, to the same standard of care as if operated within the originating organisation and in line with the CSCF security controls.

The appendix G illustrates a typical spread but also share of responsibilities to consider when outsourcing to a cloud provider through an Infrastructure as a Service (IaaS) model.

[3] Also called vSRX

[4] See the Gloassary of Terms for the definition

Architecture Types

Each user must identify which of the five reference architecture types (Figures 3-7) most closely matches their own architecture deployment to determine which components are in scope. Depending on the architecture type, some security controls may or may not apply.

The five reference architectures are as follows where component or license ownership is the key differentiator:

- Architecture A1 – Users owning the communication interface (and generally the messaging interface)

  The communication interface is owned by the user.

  The Figure 3a shows the case where both the messaging interface and communication interface licenses are owned by the user and resides within its environment.

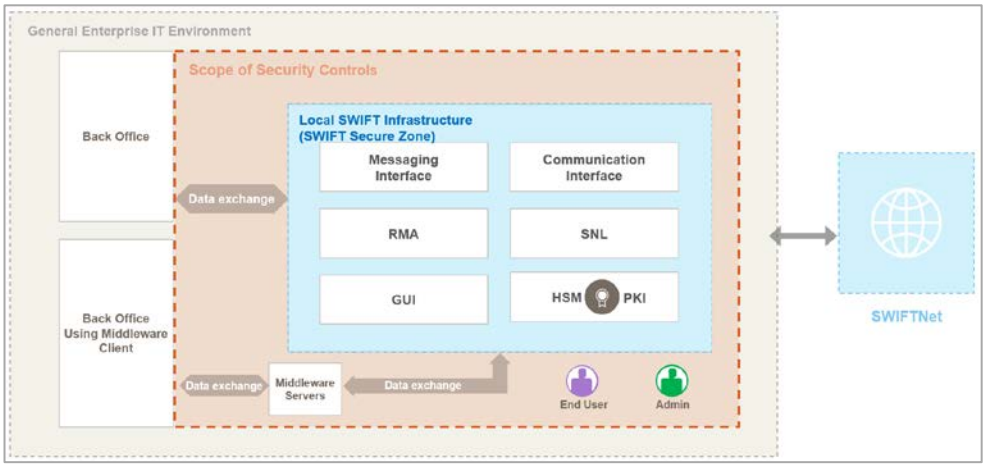


Figure 3a: Architecture A1 – Interfaces within the user environment

Users that do not own a messaging interface but own a communication interface only (such as in the Figure 3b below), are also considered as architecture A1.

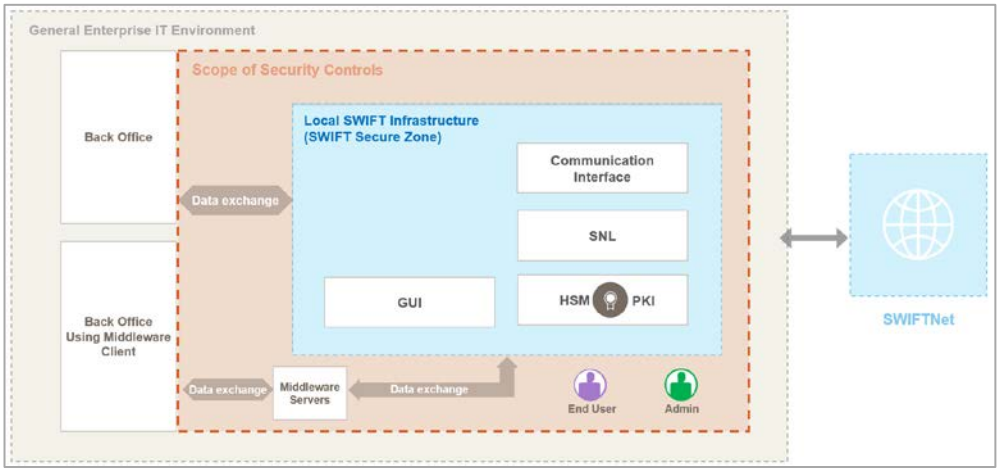


Figure 3b: Architecture A1 – Communication interface only within the user environment

The architecture A1 type also includes hosted solutions where the user owns the license for the communication interface that a) he operates on behalf of other user(s) or b) is operated for himself by a third party within or (hosted) outside the user environment.

- Architecture A2 – User owning the messaging interface but not the communication interface

The messaging interface is owned, but a service provider (for example, a service bureau, SWIFT[5] or a group hub) owns the licence for the communication interface.

The Figure 4 shows the case where the messaging interface is owned by the user and resides within the user environment.

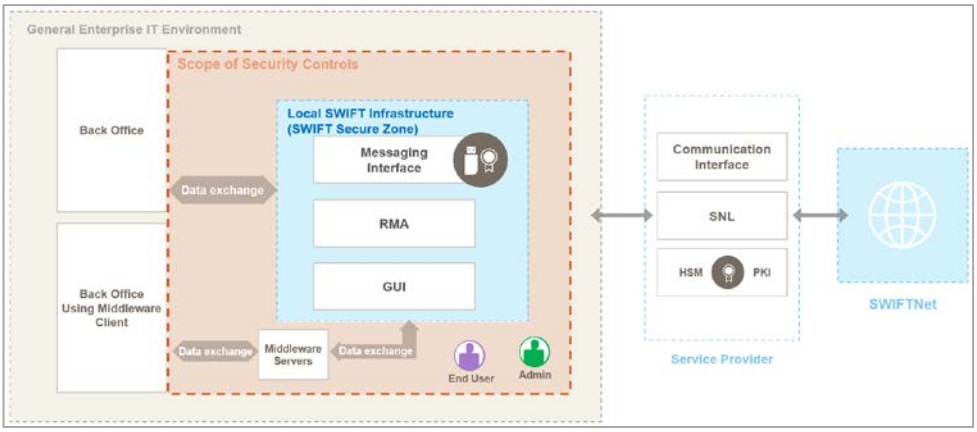


Figure 4: Architecture A2 – Messaging Interface only within the user environment

This architecture type also includes hosted solutions where the user has the licence for the messaging interface that is operated for himself by a third party or a service provider.

- Architecture A3 – SWIFT Connector

  A SWIFT connector[6] is used, such as in Figure 5, within the user environment to facilitate application-to-application communication with an interface at a service provider (for example, a service bureau, a group hub) or with SWIFT services (such as Alliance Cloud, Alliance Lite 2 and in the future a messaging service or the Transaction Platform[7] exposed by SWIFT).

  Optionally, this setup can be used in combination with a GUI solution (user-to-application). In such case, controls pertaining to the GUI also have to be implemented.

  This architecture type also includes hosted solutions of the SWIFT connector.

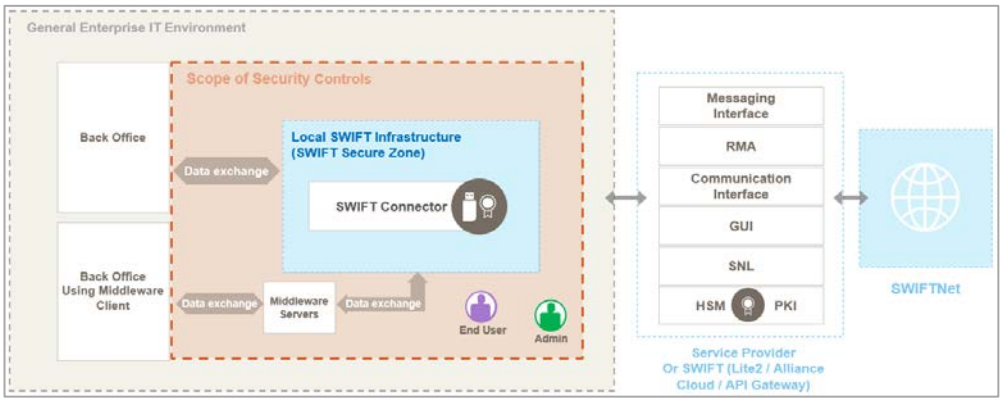


Figure 5: Architecture A3 – SWIFT Connector

- Architecture A4 –Customer Connector

  A server running software application (for example, a file transfer solution or middleware system such as IBM® MQ server or similar that are customer connectors – Figure 6a) is used within the user environment[8] to facilitate application-to-application

[5] In the scope of SWIFT Alliance Remote Gateway

[6] For example, Alliance Cloud SIL, DirectLink, Alliance Lite2 AutoClient,in combination with SIL or not, or MicroGateway

[7] To be deployed in the future as part of the Board endorsed SWIFT Strategy

[8] On premises or externally hosted, in the Cloud or not.

communication with an interface at a service provider (for example, a service bureau, a Lite2 Business Application provider or a group hub).

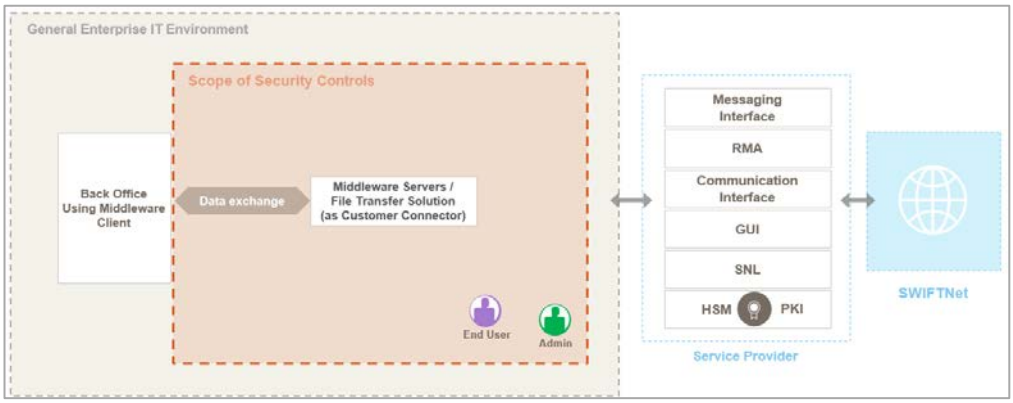


Figure 6a: Architecture A4 – Middleware/File Transfer as Connector

This specific architecture will require some users to be turned as Architecture A4:

- Users that previously attested as B Architectures when using, as customer connector, a middleware server, such as MQ server.

- Users that previously attested as A3 Architecture when using, as connector, a file transfer solution or a middleware server, such as MQ server.

Those users will have to consider the controls having middleware server in-scope.

To pave the way for the future, this architecture type A4 also includes customer connectors being own applications used within the user environment[9] that will implement SWIFT API's to directly connect and transmit independently[10] business transactions to SWIFT services (a future messaging service[11] or the Transaction Platform[12] exposed by SWIFT). The own implementation of the SWIFT API's (using either the specifications or integrating the SWIFT SDK) makes such applications a custom made API end point referred as a customer connector or non-SWIFT footprint – Figure 6b).

This last setup could also integrate a GUI solution (user-to-application). In such case, controls relevant to the GUI would have to be implemented as well.

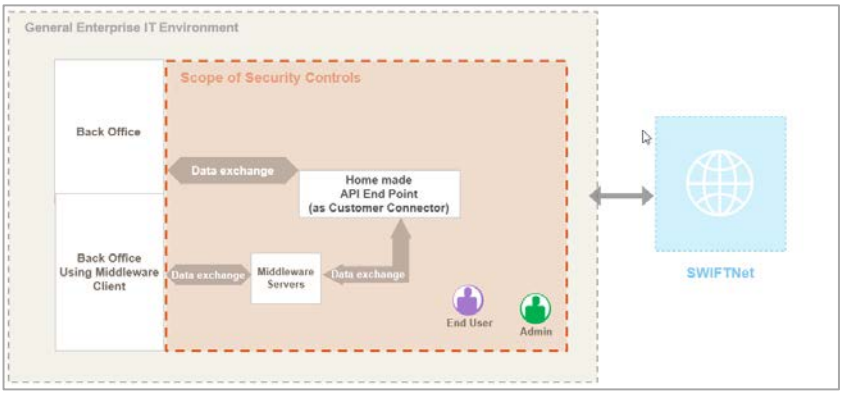


Figure 6b: Architecture A4 – Customer (home-made API) Connector

[9] On premises or externally hosted, in the Cloud or not.

[10] Without the usage of a communication interface or a dedicated SWIFT (API) Connector.

[11] Business transactions to messaging services refers to requests introducing or affecting payments (such as creation of MT103, 101, 202, 205 or cancelling/stopping/recalling/modifying those requests). On the other side, queries on previous transactions (such as through the Basic Tracker), prevalidation, conversion or screening performed before submitting business transactions are not considered affecting messaging services.

[12] To be deployed in the future as part of the Board endorsed SWIFT Strategy

- Architecture B – No local user footprint

  No SWIFT-specific infrastructure component is used within the user environment. Two type of setups are covered by this architecture type:

  – Users only access SWIFT messaging services via a GUI application at the service provider (user-to-application). The PC or device used by those users to submit or affect business transactions should be considered as a (general purpose) operator PC and protected accordingly.

  – Users' back office applications communicate directly with the service provider (application-to-application) using APIs from the service provider or a Middleware client (such as MQ Client) without connecting or transmitting independently business transactions to SWIFT Alliance Cloud, a SWIFT messaging service, the SWIFT API Gateway[13] or, in the future, the Transaction Platform[14] exposed by SWIFT. In such case, the service provider has to ensure the security of his environment and of the data exchange with the user in line with the CSCF controls. Categorising this setup as architecture type B is in line with the scope of the security controls, which excludes user back office applications. However, SWIFT strongly recommends already implementing the architecture type A4 controls on these applications integrating API or a Middleware client (such as MQ Client).

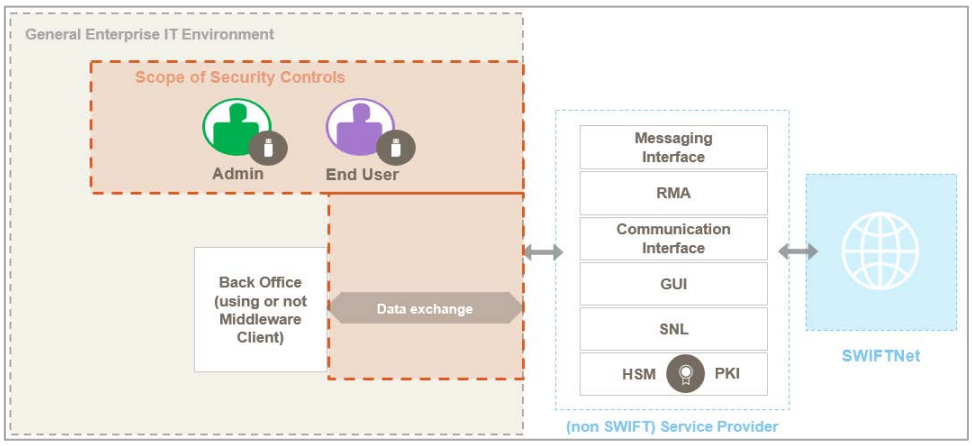


Figure 7: Architecture B - No user footprint connecting to a Service Provider (not SWIFT)

This architecture type also includes users who only access with a browser, SWIFT messaging services (user-to-application) exposed by Alliance Cloud and Alliance Lite2. PCs used by those users to submit or affect business transactions must be considered as (general purpose) operator PCs and protected accordingly.

The security controls applicable for architectures A1, A2, and A3 are identical[15] and fewer controls apply to architecture A4. These architectures are referenced collectively on the following pages as type “A”. Fewer security controls apply to users that utilise architecture type "B" (see section Security Controls Summary Table to identify them).

[13] Would otherwise be considered as an architecture type A4 with a customer connector.
[14] To be deployed in the future as part of the Board endorsed SWIFT Strategy
[15] Except for Control 6.3 Database Integrity that explicitly does not apply to architecture A3

Security Controls Structure

Each security control in this document is structured into three parts: general control information, control definition, and implementation guidance, as described below.

General Control Information

- **Control Number and Title -** Each control has a unique number and title. If the control number is suffixed with an "A", this indicates that the control is "Advisory".
- **Control Type -** This identifies the control as "Mandatory" or "Advisory". Users must implement all Mandatory controls applicable to them taking into account their architecture type. Advisory controls are considered good security practice and are strongly recommended for additional implementation.
- **Applicability to Architecture types** - Controls are applicable either to users with architecture type A1, A2 and A3), type A4, type B or a combination of types. As such, users with type B architecture are not required to comply with controls applicable to type A1, A2 and A3 only.

Control Definition

- **Control Objective** - States the security goal to be achieved irrespective of the implementation method.
- **In-Scope Components** - The specific SWIFT-related components that are covered by this particular control. (Also see Scope of Security Controls).

  Note: when extending scope to new components, these new in-scope components can initially be tagged as Advisory[16].
- **Risk Drivers** - Details the specific risks which are addressed by this security control. A full matrix of risks is documented in Appendix A.

Implementation Guidance

- **Control Statement** - The suggested means by which the Control Objective can be fulfilled.
- **Control Context -** Additional introductory background information about this control.
- **Implementation Guidelines** - SWIFT-formulated method for control implementation.

Important Users must attest against their compliance with all mandatory control objectives. Additional details on implementation options for compliance are described in the next section. Users can also find additional valuable information in the CSP FAQ (SWIFT Knowledge Base TIP 5021823) and the Security Guidance Document (log in on swift.com required)

[16] The Change Management process ensures that the SWIFT community has sufficient time to understand and implement any future changes to the control requirements. Typically, new mandatory controls will be first introduced as advisory, thereby giving all users at least two cycles to plan, budget and implement.

Security Controls Compliance

As per the above-described security controls structure, the objective of a control states the security goal to be achieved irrespective of the implementation method used.

To comply with a CSP security control, users must implement a solution that:

1. Meets the stated control objective,
2. Addresses the risk drivers (see Appendix A for a risk matrix and Appendix C for illustrations of such risks), and
3. Covers the documented in-scope components relevant for the user's architecture.

The Control Statement is the suggested means to fulfil the control objective and the Implementation Guidelines are common methods for implementing the control.

Compliance can be obtained by either of the following methods:

A) Implementing a solution aligned with the implementation guidance provided in this document.

The implementation guidance section should not be considered as a strict "audit checklist" because each user implementation may vary. Therefore, in the case that some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall guidelines adherence level.

B) Implementing an alternative solution to the SWIFT-formulated implementation guidance, which equally meets the control objective and addresses related outlined risks.

In such case, deployed controls, their effectiveness as well as particular environment specificities have to be taken into account to properly assess the control objective compliance of the solution (risk assessment approach).

Both methods are to be considered as valid and equally robust from a risk perspective.

Users are ultimately responsible for assessing the suitability of SWIFT-formulated implementation guidance in their environment or determining if they wish to adopt alternative implementation solutions.

It is the expectation that only a small subset of users - typically those with a high level of Information Security Risk Management maturity within their organisation - will consider alternative implementation routes for one or more controls to cope with large or complex configurations.

Security Controls Summary Table

The following table provides an overview of all mandatory and advisory security controls, structured according to the principle they support and with reference to the architecture type to which they relate. In addition, the table identifies the relevance of the controls, depending on the architecture type. Advisory controls are notated with an "A" after the control number (for example, "2.4A") throughout this document, and are also shaded in the table below.

Mandatory and Advisory Security Controls	Architecture Type		
	A1→A3	A4	B
1 Restrict Internet Access and Protect Critical Systems from General IT Environment			
1.1 SWIFT Environment Protection	●		
1.2 Operating System Privileged Account Control	●	●	
1.3 Virtualisation Platform Protection	●	●	
1.4 Restriction of Internet Access	●	●	●
2 Reduce Attack Surface and Vulnerabilities			
2.1 Internal Data Flow Security	●		
2.2 Security Updates	●	●	●
2.3 System Hardening	●	●	●
2.4A Back Office Data Flow Security	●	●	●
2.5A External Transmission Data Protection	●	●	
2.6 Operator Session Confidentiality and Integrity	●	●	●
2.7 Vulnerability Scanning	●	●	●
2.8A Critical Activity Outsourcing	●	●	●
2.9A Transaction Business Controls	●	●	●
2.10 Application Hardening	●		
2.11A RMA Business Controls	●	●	●
3 Physically Secure the Environment			
3.1 Physical Security	●	●	●
4 Prevent Compromise of Credentials			
4.1 Password Policy	●	●	●
4.2 Multi-factor Authentication	●	●	●
5 Manage Identities and Segregate Privileges			
5.1 Logical Access Control	●	●	●
5.2 Token Management	●	●	●
5.3A Personnel Vetting Process	●	●	●
5.4 Physical and Logical Password Storage	●	●	●
6 Detect Anomalous Activity to Systems or Transaction Records			
6.1 Malware Protection	●	●	●
6.2 Software Integrity	●		
6.3 Database Integrity	●[17]		
6.4 Logging and Monitoring	●	●	●
6.5A Intrusion Detection	●	●	

[17] Not applicable to A3

7 Plan for Incident Response and Information Sharing			
7.1 Cyber Incident Response Planning	•	•	•
7.2 Security Training and Awareness	•	•	•
7.3A Penetration Testing	•	•	•
7.4A Scenario Risk Assessment	•	•	•

The following two figures present visually where the controls would apply using for reference one of many ways an architecture A1 could be designed (see also appendix B for some other reference architectures).

Figure 8 shows the controls applied at the infrastructure and hosts level combined with organisational controls surrounding such environment. Figure 9 shows the interactive or application flow controls between the SWIFT-related components and the operator PCs or back office systems.

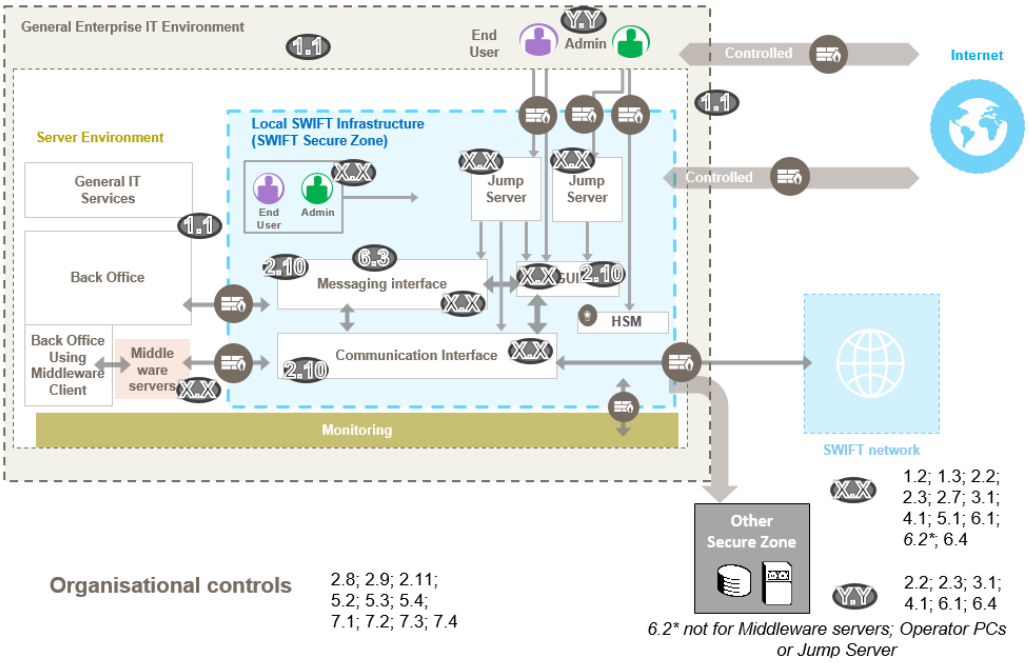


Figure 8: Infrastructure static and organisational controls

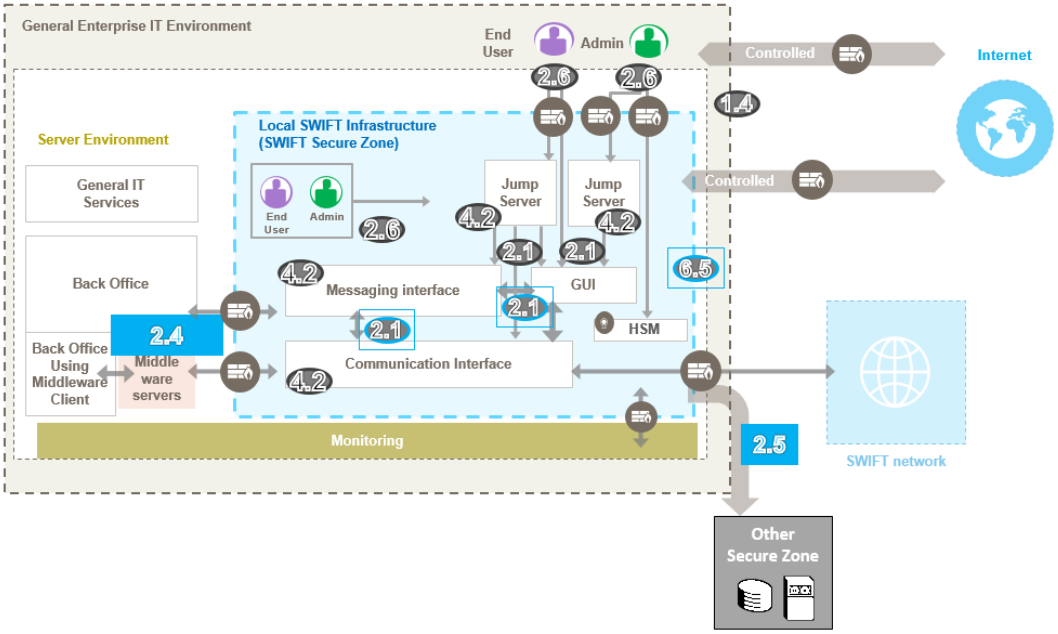


Figure 9: Human/Application to Machine/application flow controls

Detailed Control Descriptions

1 Restrict Internet Access & Protect Critical Systems from General IT Environment

1.1 SWIFT Environment Protection

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		•		

Control Objective: Ensure the protection of the user's local SWIFT infrastructure from potentially compromised elements of the general IT environment and external environment.

In-scope components:

- Messaging interface
- Communication interface
- GUI
- SWIFTNet Link
- Hardware Security Module (HSM)
- SWIFT connector
- Jump server
- Dedicated and general purpose operator PCs

Risk Drivers:

- Compromise of enterprise authentication system
- Compromise of user credentials
- Credential replay
- Exposure to internet-based attacks
- Unauthorised access

Implementation Guidance

Control Statement:

A segregated secure zone safeguards the user's SWIFT infrastructure from compromises and attacks on the broader enterprise and external environments.

Control Context:

Segmentation between the user's local SWIFT infrastructure and its larger enterprise network reduces the attack surface and has shown to be an effective way to defend against cyber attacks that commonly involve compromise of the general enterprise IT environment. Effective segmentation will include network-level separation, access restrictions, and connectivity restrictions.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●		

a) Overall design goals for implementing environment segregation

- Implement a “secure zone” to separate and protect the local SWIFT infrastructure from the compromise of systems and services located outside of the secure zone.
- To the fullest extent possible, passwords and other authenticators that are usable inside the secure zone (especially for privileged accounts) are not stored or used in any form (hashed, encrypted, or plaintext) in systems outside of the secure zone. This does not apply to encrypted backup files. If the authentication services system is residing outside of the SWIFT secure zone:
  - Either the system is in another existing secure zone that has similar controls,
  - Or the system is only used to filter the connections to the SWIFT infrastructure component (controlling then the connectivity at the boundary of the secure zone). In such case, logical access to the SWIFT infrastructure component is ensured by another authentication mechanism residing in the secure zone (another IAM or the accessed component itself).
- The secure zone is scoped appropriate to each user's environment, including the potential reuse of existing secure zones (for example, a secure “production environment”, “back office environment”, or “payment systems zone”) to include the local SWIFT infrastructure.
- The components within the secure zone are all protected to the same or an equivalent level of security, access control, trust and may communicate freely within the zone..
- Appendix B contains illustrative architecture diagrams showing samples of the many ways a secure zone may be designed.

b) Scope of the secure zone

- The secure zone contains, but is not limited to, all components of the local SWIFT infrastructure. This includes: the messaging interface, communication interface, browser-based GUI, SWIFTNet Link, Hardware Security Module (HSM), SWIFT connector, jump server (see details below), and any applicable operator PCs solely dedicated to the operation or administration of the local SWIFT infrastructure.
  - General purpose operator PCs are not included in the secure zone.
  - Dedicated operator PCs with SWIFT-related software installed (that is, "thick client" GUI software) are located in the secure zone, or the software is installed only on the jump server to be accessed by the general purpose operator PCs outside of the secure zone.
  - Back office and middleware systems (for example, IBM® MQ server) are not necessarily included in the secure zone, but may be considered for inclusion depending on the chosen size and scope of the secure zone.
  - Test systems are preferably fully segregated from production systems (incl. separate HSMs) and configured to only support test traffic (for example, by only using lite certificates and only configuring test logical terminals). If not fully segregated, these systems must be maintained to the same security level as the production systems.
    Development systems are not within the secure zone and are not connected to the SWIFT network.
  - The Alliance Connect VPN boxes or their virtual instances (hosting systems or machines) are in a secure environment with appropriate physical controls (in line with control 3.1).
- The secure zone size and scope is defined in a way that is most appropriate to the user's environment. Options may include, but are not limited to:
  - A SWIFT secure zone dedicated only for the local SWIFT infrastructure.
  - An expansion of an existing secure area (for example, a secure “production environment” or “payment systems zone”) to include the local SWIFT infrastructure. The size and scope of this zone may vary significantly depending on the existing environment.
- Software, systems, and services within the secure zone are assessed for need and removed from the zone if not supporting the operations or security of the zone (for example, assess the need for email access).

c) Protection of the secure zone

Boundary Protection

- Transport layer stateful firewalls are used to create logical separation at the boundary of the secure zone.
  - Transport layer firewalls creating the secure zone boundary should be physically or virtually dedicated to the protection of the secure zone. In case a firewall is shared to separate other zones, care must be taken

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●		

for its management to ensure that compromise of the firewall should not affect the protection of the secure zone.

- ACLs, and application firewalls may be used to provide additional protections for the secure zone, but are not alone sufficient.

- Layer 2 devices (data link layer, such as switches) may be shared between the secure zone and other uses (VLAN segregation).
- Administrative access to networking devices is protected using either an out-of-band network or through controlled in-band access (for example, a management VLAN). Administrative access to the firewall(s) protecting the secure zone does not rely on the enterprise user authentication system but a system located within an existing secure zone that has similar controls as the SWIFT secure zone.
- Inbound and outbound connectivity for the secure zone is limited to the fullest extent possible. A process is implemented to analyse, review, and enforce the firewall rules governing the connectivity.
  - No "allow any" firewall rules are implemented, and all network flows are explicitly authorised (whitelisting). To achieve this, a general enterprise server might initially be used to filter legitimate connectivity access towards the secure zone without losing traceability of such connections.
  - Generally, connectivity crossing the secure zone boundary is restricted to: bi-directional communications with back office applications and MV-SIPN[18], inbound communications from approved general purpose operator PCs to the jump server, and outbound administration data (data logging, backups).
  - Firewall rules are reviewed at least annually.
  - Connections through the boundary firewalls are logged.

d) Access to the secure zone systems

d.1 Local Operator (end user and administrator) access

- The secure zone has implemented one of the following designs for restricting operator access (interactive or command-line sessions) into the secure zone:
  - Operators connect from dedicated operator PCs located within the secure zone (that is, PCs located within the secure zone, and used only for secure zone purposes).
  - Operators connect from their general purpose operator PC to the secure zone via a jump server (for example, using a Citrix-type solution or Microsoft Terminal Server) located within the SWIFT secure zone or within another existing secure zone that has similar controls.
    As the entry point into the secure zone, the jump server implements strong security practices, including:
    - Ensuring all in-scope security controls in this document are implemented (for example: security updates, system hardening),
    - Separate jump server for system administrators (with multi-factor authentication) and end users,
      As an alternative to separate jump servers, only allow temporary access to system administrators with effective approval process and session activity recording.
    - Restricting access to only authorised operators,
    - Removing any unnecessary software,
    - Restricting risky activity (for example: sending/receiving email),
    - Enabling logging.
  - Operators connect from their general purpose operator PC and only access the messaging or communication interface using a browser-based GUI (for example, Alliance Web Platform). Specific security controls apply to this setup:
    - The browser-based GUI is located in the secure zone and is logically separated from the messaging and communication interface.
    - Multi-factor authentication is implemented where appropriate (on the browser-based GUI, on the messaging interface, or on the communication interface).
    - This setup cannot be used for operating system administration activities.
- SWIFT systems within the secure zone restrict administrative access to only expected ports, protocols, and originating IPs.

d.2 Remote Operator Access (teleworking, “on-call” duties, or remote administration)

[18] Multi-Vendor Secure IP Network

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●		

- Remote access to the secure zone from outside of the local user network first requires VPN authentication (recommended with multi-factor authentication) to the local network before accessing the secure zone via the same secured channels as local operators.
- A risk assessment is performed by the user to consider additional security controls to be implemented for remote access, such as use of virtual desktop infrastructure, dedicated channels for connectivity (for example, dedicated jump servers for remote users, leased lines).

e) Segregation from General Enterprise IT Services

- To protect the secure zone from credential theft and/or compromise of enterprise authentication (LDAP, RADIUS, Identity Provider, multi-factor) services, secure zone systems use a separate authentication system from the general enterprise authentication service. For example, secure zone systems are not a member of the corporate directory service, but are instead members of a secure zone directory service.
- Supporting IT infrastructure, such as asset management, databases, data storage, security services (for example, patching) and networking services (for example, DNS, NTP) used within the secure zone is protected from credential compromise within the larger enterprise. Institutions must conduct an analysis of connectivity points ensuring that these systems do not store authenticators (passwords, tokens, etc.) for systems and accounts in scope in any format (hashed, encrypted, plaintext) outside of the secure zone or another existing secure zone that has similar controls. Indeed, the supporting IT infrastructure need not be exclusive to SWIFT systems and may be shared within the secure zones.

Optional Enhancements:

- Systems within the secure zone implement, when technically possible, application whitelisting, allowing only trusted applications to be executed.
- Restrict, through additional segregation, the communication between components of the secure zone considering:
  - Network ACLs or host-based firewalls restricting traffic on a host-by-host basis within the secure zone.
  - Individual hardware or network-based firewalls between the components in the secure zone can optionally be used.

Considerations for alternative implementations:

Institutions with a high level of security programme maturity within their organisation may consider implementing alternative controls such as those suggested below or others. The alternative solutions must be risk-appropriate to each environment, and consider the effort required to effectively implement, manage, and maintain the solution.

- Not segregating secure zone authentication services from the enterprise authentication service will require implementing a comprehensive set of defence-in-depth controls to protect from and detect adversaries crossing the secure zone boundary. Controls may include: locating the authentication service within an existing secure zone that has similar controls as the ones applicable to the SWIFT secure zone, limiting trust relationships between the larger enterprise environment and the secure zone (such as one-way trust relationships), restricting operator and administrative access, implementing strong privileged access controls, implementing read-only access where feasible, enabling verbose logging, and implementing centralised active monitoring and detective capabilities.
- If general enterprise IT services (for example, vulnerability scanning, boundary firewall management) are shared between the secure zone and other environments, any credentials used across the environment should be monitored to ensure they are only used when and where expected.
- If a general enterprise server is initially used to reach the secure zone, that server is only used to filter legitimate connectivity access (being as such a concentrator or gateway to ease access filtering to the secure zone). Identity and access management for secure zone components and/or the jump server still relies on authentication services residing within the SWIFT secure zone or another existing secure zone that has similar controls.
- If the secure zone has dependencies on enterprise shared functions (such as directory services, servers or networks) that are outside the scope, the user must ensure that any compromise of such functions will not compromise the security of the in-scope components.

1.2 Operating System Privileged Account Control

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	

Control Objective: Restrict and control the allocation and usage of administrator-level operating system accounts.

In-scope components:

- Secure zone: administrator-level operating system accounts (on physical or virtual machines)
- Local or remote (hosted and/or operated by a third party) Virtualisation platform (also referred as the hypervisor) hosting SWIFT-related VM's: platform administrator-level accounts
- [Advisory A1/A2/A3: Middleware server (such as IBM® MQ server or similar) utilised to exchange with SWIFT-related components]
- [Advisory A4: Customer connector]

Risk Drivers:

- Deletion of logs and forensic evidence
- Excess privilege or access
- Lack of traceability
- Unauthorised system changes

Implementation Guidance

Control Statement:

Access to administrator-level operating system accounts is restricted to the maximum extent possible. Usage is controlled, monitored, and only permitted for relevant activities such as software installation and configuration, maintenance, and emergency activities. At all other times, an account with least privilege access is used.

Control Context:

Tightly protecting administrator-level accounts within the operating system reduces the opportunity for an attacker to use the privileges of the account as part of an attack (for example, executing commands, deleting evidence).

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- Administrator-level accounts are defined as:
  - Windows: built-in administrator account and members of groups with administrator privileges (for example, accounts with debug or file system privileges). Typically, Enterprise Admins group, Domain Admins group and Local Administrator group.
  - Linux/Unix: root account (User ID = 0) and members of the root group.
  - Mainframe: system administrator or system programmer role.
- Access to administrator-level operating system accounts is restricted to the maximum extent possible unless needed to install, configure, maintain, operate and support emergency activities. The use of the administrator-level account is limited to the duration of the activity (for example, maintenance windows).
- Log-in with built-in administrator-level accounts is not permitted, except to perform activities where such accounts are specifically needed (for example, system configuration) or in emergency situations (break-glass account). Individual accounts with administrator-level privileges or accounts with the ability to escalate to

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	

administrative access, (like 'sudo') are used instead.

- Individual administrator-level account access and usage are logged so that activities can be reconstructed to determine the root-cause of incidents.
- Administrator-level passwords are tightly controlled with physical access controls when physically recorded.

Optional Enhancements:

- Systems are configured to not allow log-in of built-in administrator-level accounts, except via a maintenance mode (for example, single user mode or safe mode). This effectively prohibits logging into the account as a service, batch job, through remote desktop services, or by escalating privilege from another account.

1.3 Virtualisation Platform Protection

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	

Control Objective: Secure virtualisation platform and virtual machines (VM's) hosting SWIFT related components to the same level as physical systems.

In-scope components:

- Local or remote (hosted and/or operated by a third party) Virtualisation platform (also referred as the hypervisor) and VM's used to host any of the below SWIFT related components:
  - Messaging interface
  - Communication interface
  - GUI
  - SWIFTNet Link
  - SWIFT connector
  - Jump server
  - Dedicated and general purpose operator PCs
  - Firewalls
  - [Advisory A1/A2/A3: Middleware server (such as IBM® MQ server or similar) utilised to exchange with SWIFT-related components]
  - [Advisory A4: Customer connector]

Risk Drivers:

- Unauthorised access
- Uncontrolled proliferation of systems and data

Implementation Guidance

Control Statement:

Secure virtualisation platform, virtualised machines and supporting virtual infrastructure (such as firewalls) to the same level as physical systems.

Control Context:

Security controls that apply to non-virtualized (i.e. physical) systems are equally applicable to virtual systems. The additional virtualisation layer needs extra attention from a security point of view. Uncontrolled proliferation of VM's could lead to unaccounted-for machines with the risk of unmanaged, unpatched systems open to unauthorised access to data,

Providing appropriate controls have been implemented to this underlying layer, SWIFT does not limit the use of virtual technology for any component of the local SWIFT infrastructure or the associated supporting infrastructure (for example, virtual firewalls).

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

When relying on a third party for the underlying virtualisation platform, the user has to engage with the third party to obtain reasonable comfort the control objective is met.

- The same security requirements apply to the virtualisation platform, virtual machines and supporting virtual infrastructure as for all other infrastructure systems and components. Those security requirements cover, for

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	

example, location in an existing secure zone that has similar controls as the ones applicable to the SWIFT secure zone, privileged access restrictions, log-in and password policy, installation of security patches, and restriction of internet access. Those controls have the virtualisation platform identified in their “In-scope components” section.

- Vulnerability scanning is performed on SWIFT-related VM’s and when technically possible on the virtualisation platform.
- The virtualisation platform hosts are subject to physical protection preventing unauthorised physical access.
- VM’s isolation is ensured on the virtualisation platform to prevent a) lateral move out of a virtual machine to access or interact with other VM’s or the underlying hypervisor or b) bypassing normal network controls that filter and/or inspect connections to the SWIFT environment.
    - Filtering and expected inspection of the network flows reaching the SWIFT-related VMs are performed preferably using resources (such as FW, packet inspections or content filtering) external to the virtualisation platform or must be enforced at the hypervisor level.
    - Provided that isolation is ensured on the virtualisation platform, the hosted VM’s can keep their (security) classification and be individually secured accordingly (as such, they would not inherit the classification of the SWIFT related VM’s and be subject to all SWIFT related controls).
- If multi-factor authentication is implemented for interactive access to the SWIFT related VM’s operating systems, in line with control 4.2, preventing direct access to those VM’s from the hypervisor layer, multi-factor authentication is not mandated at the virtualization platform management level.

1.4 Restriction of Internet Access

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		•	•	•

Control Objective: Control/Protect Internet access from operator PCs and systems within the secure zone

In-scope components:

- Dedicated and general purpose operator PCs
- Jump Server
- [Advisory A1/A2/A3: Middleware server (such as IBM® MQ server or similar) used to exchange with SWIFT-related components]
- [Advisory A4: Customer connector]
- [Advisory : Local or remote (hosted and/or operated by a third party) Virtualisation platform (also referred as the hypervisor) and their management PCs]
- Messaging interface
- Communication interface
- GUI
- SWIFTNet Link
- SWIFT connector

Risk Drivers:

- Exposure to internet-based attacks

Implementation Guidance

Control Statement:

All general purpose and dedicated operator PCs as well as systems within the secure zone have controlled direct internet access in line with business[19].

Control Context:

Direct access to the Internet raises exposure to internet-based attacks. Risk is even higher in case of human interactions (browsing, emails or other social network activities being permitted). Once compromised, those systems can be an entry point allowing lateral movements and/or injection of command and control elements.

If reducing attack surface and vulnerabilities of those systems, as per the relevant controls identified in this document, is primordial, limiting and controlling direct Internet accesses is key.

On top of (general) operator PCs that connect swift-related services or applications offered by service providers (such as SWIFT in the case of Lite2 or Alliance Cloud, a Service Bureau, an L2BA provider), due diligence must be taken to secure (general) operator PCs used to access local interfaces or GUI. Insecurely combining access to the "production environment" and internet could be abused by attackers.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

[19] Purpose is not to prohibit internet access but to limit/control connectivity where it is relevant for business related reasons (such as to access external service provider resources).

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

a) Internet access from the secure zone

- General purpose internet browsing (including Web Mail activities) from systems within the SWIFT secure zone is not permitted.
- Internet access from systems within the secure zone (for example, dedicated operator PCs or other SWIFT-related components) is highly restricted and ideally blocked.
  - When possible, activities that require the internet are conducted outside of the secure zone. Example activities may include conducting daily business on swift.com, or downloading security patches for secure transfer into the secure zone.
  - If internet access is needed from within the secure zone, access should be granted only to whitelisted URL destinations via a proxy with content inspection and adequate blocking/filtering controls. Connections are only permitted if initiated in the outbound direction.
- As the entry point into the secure zone, the jump server, located within the secure zone or another existing secure zone that has similar controls, does not have internet access.

b) Internet access from general operator PCs

- Control internet access provided on the general purpose operator PCs used to
  - connect to an application at the service provider (user-to-application) to process financial transactions[20].
  - access a messaging or communication interface through a browser-based GUI (for example, Alliance Web Platform)

  Through one of the following options:

  1. Internet access through a remote desktop or virtual machine solution
  2. Internet access from the general purpose operator PC to only whitelisted URL destinations via a proxy with content inspection, in combination with adequate blocking/filtering controls and permitting only outbound initiated connections.

  3. Internet access from the general purpose operator PC through a Web Gateway (with content inspection, in combination with blocking/filtering controls) using maintained blacklisted URL destinations

- Even if SWIFT strongly recommends to control internet access, another way to meet the control objective on those PCs accessing the local SWIFT infrastructure is to enforce usage of a jump server that has no internet access combined with multi-factor authentication, in line with control 4.2, implemented on the individual SWIFT related applications/systems or at the jump server.

c) Internet Access from other components (middleware servers or the virtualisation platform - Advisory)

- Internet access from, when used, the middleware system (such as IBM® MQ server) or the virtualisation platform underlying system (also referred as the hypervisor) is highly restricted and ideally blocked.
  - When possible, activities that require the internet are conducted from other systems. Example of such activities include conducting daily business, or downloading security patches for secure transfer into the target system.
- If internet access is needed from those systems, access should be granted only to whitelisted URL destinations via a proxy with content inspection and adequate blocking/filtering controls. Connections are only permitted if initiated in the outbound direction.

[20] Such as posting, creating, approving or modifying messaging transactions or updating entitlements. Read-only/queries kind of access can be waived if entitlements cannot be changed from such operator PC's.

2 Reduce Attack Surface and Vulnerabilities

2.1 Internal Data Flow Security

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●		

Control Objective: Ensure the confidentiality, integrity, and authenticity of application data flows between localSWIFT-related applications.

In-scope components:

- Jump server when used
- Local or remote (hosted and/or operated by a third party) SWIFT-related infrastructure components

Risk Drivers:

- Loss of sensitive data confidentiality
- Loss of sensitive data integrity
- Unauthenticated system traffic
- Unauthorised access
- Password theft

Implementation Guidance

Control Statement:

Confidentiality, integrity, and authentication mechanisms are implemented to protect SWIFT-related application-to-application and, when used, jump server-to-application, data flows.

Control Context:

Protection of internal data flows safeguards against unintended disclosure, modification, and access of the data while in transit.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- All data flows between SWIFT-related applications are protected using a secure mechanism (for example, "Local Authentication (LAU) in combination with a confidentiality protection[21]" or "2-way TLS") to support the confidentiality, integrity and mutual authentication of the data flows. This includes the following data flows:
  - RMA application to messaging interface,
  - GUI to messaging interface,
  - GUI to communication interface,
  - Messaging interface to communication interface.

[21] Such as one-way TLS

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●		

- The communication between the jump server when used, and the SWIFT-related applications is protected using a secure mechanism (for example, one-way TLS) to support the confidentiality and integrity of the users' connection to the applications.
- Secure protocols use current, commonly accepted cryptographic algorithms (for example, AES[22], ECDHE[23]), with key lengths in accordance with current best practices. More guidelines on cryptographic algorithms supporting secure protocols can be found in SWIFT Knowledge Base TIP 5021566.

[22] Advanced Encryption Standard

[23] Elliptic Curve Diffie-Hellman Ephemeral

2.2 Security Updates

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Minimise the occurrence of known technical vulnerabilities on operator PCs and within the local SWIFT infrastructure by ensuring vendor support, applying mandatory software updates, and applying timely security updates aligned to the assessed risk.

In-scope components:

- Dedicated and general purpose operator PC and, when used, jump server: all hardware and software
- Local or remote (hosted and/or operated by a third party) Virtualisation platform (also referred as the hypervisor) hosting SWIFT-related VM's and their management PCs
- Secure zone: all hardware including network devices and software
- [Advisory A1/A2/A3: Middleware server (such as IBM® MQ server or similar) utilised to exchange with SWIFT-related components]
- [Advisory A4: Customer connector]

Risk Drivers:

- Exploitation of known security vulnerabilities

Implementation Guidance

Control Statement:

All hardware and software inside the secure zone and on operator PCs are within the support lifecycle of the vendor, have been upgraded with mandatory software updates, and have had security updates promptly applied.

Control Context:

The closure of known security vulnerabilities is effective in reducing the various pathways that an attacker may use during an attack. A security update process that is comprehensive, repeatable and implemented in a timely manner, is necessary to continuously close these known vulnerabilities when security patches are available.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- Vendor support
  - All software (including operating systems) and hardware (including network devices) are within the actively supported product lifecycle window of the vendor (including extended support), if applicable.
  - Maintenance or licensing contracts are in place for access to updates, minor upgrades, and other critical maintenance functions.
- Mandatory software updates
  - Mandatory releases or updates that are applicable to a local SWIFT component are installed within the deadline specified by the vendor.
- Application of security updates
  - A risk assessment process is in place to determine the most appropriate treatment of vendor security updates/patches. Risk assessment considerations may include: the vendor-reported criticality of the

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

patch, user exposure and vulnerability, mitigating controls, and operational impact.

- User-defined deployment timelines are established for applying patches based on criticality, system type, and required patch testing.
- In the absence of established internal processes and timelines, SWIFT recommends the use of Common Vulnerability Scoring System (CVSS) Version 3 as a guideline for criticality, with the following patch deployment targets:
  - Critical (9.0+ score): applied within 1 month of release
  - High (7.0 - 8.9 score): applied within 2 months of release
  - Low / Medium (< 7.0 score): user defined.
- Note: It is common practice that operating system security updates/patches are usually automatically pushed and applied on the Operator PCs shortly after their publication by the provider.

- Source and integrity validation of software and security updates
- Before applying the software and security updates, their legitimate source is validated and integrity checks (for example checksum validation) performed when technically possible.

2.3 System Hardening

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		•	•	•

Control Objective: Reduce the cyber attack surface of SWIFT-related components by performing system hardening.

In-scope components:

- Operating systems for dedicated and general purpose operator PC and when used jump server
- Operating systems for SWIFT-related applications (including VM's)
- Local or remote (hosted and/or operated by a third party) Virtualisation platform (also referred as the hypervisor) hosting SWIFT-related VM's and their management PCs
- Supporting infrastructure within the secure zone (for example, firewalls, routers)
- [Advisory A1/A2/A3: Middleware server (such as IBM® MQ server or similar) utilised to exchange with SWIFT-related components]
- [Advisory A4: Customer connector]

Note: SWIFT HSMs are FIPS 140-2 Level 3 compliant with hardened underlying OS and are out of scope of this control.

Risk Drivers:

- Excess attack surface
- Exploitation of insecure system configuration

Implementation Guidance

Control Statement:

Security hardening is conducted and maintained on all in-scope components.

Control Context:

System hardening applies the security concept of "least privilege" to a system by disabling features and services that are not required for normal system operations. This process reduces the system capabilities, features, and protocols that a malicious person may use during an attack.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- All in-scope systems are hardened considering one or more of the following:
  - Vendor security configuration guidance,
  - Industry-standard security configuration guidance (for example,[24] CIS , DISA STIG, NIST),
  - A local or regulator's standard security configuration or controls set of the same rigour as the vendor or industry guidance.

[24] Center for Internet Security; Defense Information Systems Agency - Secure Technical Implementation Guide; National Institute of Standards and Technology

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

- The selected hardening configuration (set of rules) can be overruled by application-specific configuration requirements to maintain a proper operational state for SWIFT-related systems.
- At a minimum, the hardening process should:
  - Change default passwords,
  - Disable or remove unnecessary user accounts,
  - Disable or restrict unnecessary services, ports, and protocols,
  - Remove unnecessary software,
  - Restrict physical ports (for example, USB) as appropriate,
  - Set, when technically possible, auto-lock options (such as activating an operator PC screen saver requiring to sign-in again after an inactivity time-out or once turned into sleep mode – a 15-minute inactivity time-out is recommended)
  - Adjust any default configurations known to be vulnerable.

  The vendor and industry standards listed above can provide detailed guidance on accomplishing these minimum targets.
- Deviations from the selected hardening configuration are documented along with justification for the deviation and potential mitigations applied.
- Systems are maintained secure:
  - By checking regularly, at least twice a year, the systems against the secure settings identified as per preceding guidance to take any relevant corrective actions
  - Or by regularly applying the identified secure settings to the systems.

2.4A Back Office Data Flow Security

Control Type: Advisory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Ensure the confidentiality, integrity, and mutual authenticity of data flows between local or remote SWIFT infrastructure components and the back office first hops they connect to.

In-scope components:

- Data exchange layer: flows of financial transactions between the local or remote (hosted and/or operated by a third party) SWIFT-related components (interfaces or connectors) and the back office first hops, at application level, they are connected to (directly or through middleware)

Risk Drivers:

- Loss of sensitive data confidentiality
- Loss of sensitive data integrity
- Unauthenticated system traffic

Implementation Guidance

Control Statement:

Confidentiality, integrity, and mutual or message level based authentication mechanisms are implemented to protect data flows between SWIFT infrastructure components and the back office first hops they connect to.

Control Context:

Protection of data flows/connections between the back office first hops, at application level, as seen from the SWIFT secure zone, and the SWIFT infrastructure safeguards against man-in-the-middle, unintended disclosure, modification, and data access while in transit.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- Data flowing between local or remote (hosted and/or operated by a third party) SWIFT-related components and the back office systems (or middleware systems) they are directly connected to, is protected using a secure mechanism (for example, "LAU in combination with a confidentiality protection" or another message based authentication solution, XML DSIG, AES GCM Authenticated Encryption, 2-way TLS) that provides confidentiality, integrity, and mutual authentication of the data in transit. This includes the data flow between:
  - Messaging interface and the first back office (or middleware) hops as seen from the interface,
  - Communication interface and the first back office (or middleware) hops as seen from the interface,
  - Connector and first back office (or middleware) hops as seen from the connector.
- Secure protocols use current, commonly accepted cryptographic algorithms (for example, AES[25], ECDHE[26]), with key lengths in accordance with current best practices. More guidelines on cryptographic algorithms supporting secure protocols can be found in SWIFT Knowledge Base TIP 5021566.
- As this control is expected to be (gradually) turned Mandatory in a future release, following guidelines are

[25] Advanced Encryption Standard

[26] Elliptic Curve Diffie-Hellman Ephemeral

Control Type: Advisory	Applies to architecture:	A1→A3	A4	B
		●	●	●

already provided to gradually reach compliance:

- Have an inventory of data flows between SWIFT related components and the first back office (or middleware) hops
- Have a plan to implement/activate secure mechanisms for identified flows considering
  - Implementing secure mechanisms (see first bullet above) as exposed by the interfaces, connectors or middleware server
  - Migrating opportunistically legacy and less standard flows to secure mechanisms or protocols
  - Mitigating, in the meantime, the risk of back office host spoofing or messages injection through systems or network connectivity means.

- When a middleware server or a customer connector is used, some requirements are expected on the supporting hosts; the latter are indeed the guardians of the connections between the back office and the SWIFT-related components or SWIFT:
  - Irrespective of where the middleware server or customer connector hosts are located and shared with, the same security requirements apply to those hosts, such as channelled MQ servers used to reach a back office first hop, as for other SWIFT-related components or infrastructure systems. Those security requirements cover: location in another secure zone that has similar controls as the ones applying to the SWIFT secure zone, privileged access restrictions, log-in and password policy, installation of security patches, restriction of internet access. Those controls have middleware server and/or customer connector identified, as 'Advisory' so far, in the "In-scope components" of their control definition.
  - Protection of the data on the middleware servers (such as data present in the queues of MQ servers used to reach the back office first hops) or on the customer connector has to be ensured to prevent unauthorised access. That can be done for instance by implementing thorough access control or by opportunistically encrypting queues or data at rest)
  - Protection of the SWIFT related data flowing between the middleware server hosts (such as between several channelled MQ servers) should be ensured as part of the middleware infrastructure protection by using secure mechanisms (see first bullet of the implementation guidelines above)
  - Definition and management of the connectivity rules and business flows on the middleware servers have to be secured to prevent unauthorised flows
- For middleware server (such as IBM® MQ) directly connecting SWIFT infrastructure components, it is advised to also implement the same level of protection on the flows between this middleware server and the back office first hops as seen from an application point of view by the SWIFT-related component. Similarly, it is also advised to implement the same level of protection between a customer connector and the back office first hops, if any, as seen from an application point of view. To gradually reach control compliance for those links, the following guidelines are already provided:
  - Have an inventory of SWIFT-related data flows (i) between middleware server and the back office first hops as seen from SWIFT-related component and (ii) between a customer connector and the back office first hops as seen from the customer connector.
  - Have a plan to activate secure mechanisms for identified flows considering
    - Implementing secure mechanisms (see first bullet of the implementation guidelines above) as exposed by the middleware server, the customer connector or the back office system
    - Opportunistically migrating legacy and less standard flows to secure mechanisms or protocols
    - Ensuring, in the meantime, authentication of the data sources and authorisation of the SWIFT-related data through (i) native middleware functionalities or (ii) systems or network connectivity means preventing host spoofing.

Note: SWIFT expects this control to become mandatory in a future version of this document and will phase the expectations:

- Starting with, when used, customer connector and middleware servers
- The flows between the middleware servers and the SWIFT-related components and
- Closing with the SWIFT-related flows towards the back office systems reached by the SWIFT-related components or the customer connector, directly or via the middleware server.

2.5A External Transmission Data Protection

Control Type: Advisory	Applies to architecture:	A1→A3	A4	B
		●	●	

Control Objective: Protect the confidentiality of SWIFT-related data transmitted or stored outside of the secure zone as part of operational processes.

In-scope components:

- SWIFT-related secure zone sensitive data (such as back-ups, business transaction details and credentials)

Risk Drivers:

- Compromise of trusted backup data
- Loss of sensitive data confidentiality

Implementation Guidance

Control Statement:

Sensitive SWIFT-related data leaving the secure zone as the result of (i) operating system/application backups, business transaction data replication for archiving or recovery purposes or (ii) extraction for off-line processing is protected when stored outside of a secure zone and encrypted while in transit.

Control Context:

While 2.4A covers the (back office) application flows with the SWIFT-related components, this control covers the underlying SWIFT-related data residing in the cloud or exported from the secure zone and manipulated as per operational activities (such as back-ups or manual/automated data extraction/copies).

Operating system or applications backups and replication of business transaction data can provide useful information to prepare fraudulent transactions. Their transfer, handling and storage outside of secure zones (when, for example, using the SAN/NAS[27] technology), have therefore to be secured to prevent unauthorised access. Flow or data encryption are usual means to protect such data in transit.

Back-up encryption, encryption of data at rest or appropriate authorisation and access control are usual means to protect stored data.

Off-line processing covers for example processing performed for support activities, additional analysis or business intelligence activities.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- Replicated or extracted SWIFT-related sensitive data (business transaction data revealing details such as involved debtors, creditors, accounts, amounts, trade information), passwords and other authenticators is :
  - Protected from unauthorised access when stored outside of the SWIFT secure zone or another secure zone that has similar controls as the SWIFT secure zone. Such replicated or extracted data set is also ideally encrypted when stored outside of a secure zone (this can be achieved either at data, file, application or system level),

[27] Storage Area Network / Network Attached Storage both providing network storage solutions

  - Encrypted when in transit between secure zones (for example, between data centres) or transferred outside of a secure zone (SWIFT or another zone that has similar controls). Encryption can be applied on the data or at the network/communication/transport layer.
- When relying on a remote virtualisation platform (hosted and/or operated by a third party) it is recommended to ensure encryption of the data. This can be obtained at the subscription or at storage level expected to be offered by the third party to give assurance regarding access to stored data.
- Encryption protocols or mechanisms use a current, commonly accepted cryptographic algorithm (for example, AES[28], ECDHE[29]), with key lengths in accordance with current best practices. More guidelines on cryptographic algorithms supporting currently secure protocols can be found in SWIFT Knowledge Base TIP 5021566.
- Encryption mechanisms comply with applicable laws and regulations[30].
- If the cryptography protecting SWIFT-related sensitive data has been compromised, a process should be established to apply new cryptography and secure or destroy any compromised copies of the data.

Note: It is expected that backups kept for business or system recovery are maintained in a secure zone that has similar controls as the SWIFT secure zone.

[28] Advanced Encryption Standard

[29] Elliptic Curve Diffie-Hellman Ephemeral

[30] Such as those identified by Global Partner Digital (https://www.gp-digital.org/world-map-of-encryption/)

2.6 Operator Session Confidentiality and Integrity

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		•	•	•

Control Objective: Protect the confidentiality and integrity of interactive operator sessions connecting to the local or the remote (operated by a service provider) SWIFT-related infrastructure or applications.

In-scope components:

- Dedicated and general purpose operator PC and when used jump server: sessions to operating system, network devices or to the virtualisation platform management console (also called hypervisor manager)
- Dedicated and general operator PC and when used jump server: sessions to interface applications in the secure zone or to applications at the service provider
- Secure zone: session to HSM, SWIFT-related applications, network devices and operating systems from dedicated operator PCs
- [Advisory A1/A2/A3: Operator sessions to middleware server (such as IBM® MQ server or similar) utilised to exchange with SWIFT-related components]
- [Advisory A4: Operator sessions to customer connector]

Risk Drivers:

- Loss of operational confidentiality
- Loss of operational integrity
- Password theft

Implementation Guidance

Control Statement:

The confidentiality and integrity of interactive operator sessions connecting to SWIFT-related applications (local or at the service provider) or into the secure zone is safeguarded.

Control Context:

Operator sessions, via the jump server when used, with the local or external SWIFT infrastructure pose a unique threat because unusual or unexpected activity is harder to detect during interactive sessions than it is during application-to-application activity. Therefore, it is important to protect the integrity and confidentiality of these operator sessions to reduce any opportunity for misuse or passwords theft. When used, access to the virtualisation layer (hypervisor manager) has to be similarly protected.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- All interactive sessions are protected by a cryptographic protocol (for example, ssh, https with one-way TLS).
- Protocols use a current, commonly accepted cryptographic algorithm (for example, AES[31], ECDHE[32]), with key lengths in accordance with current best practices. More guidelines on cryptographic algorithms supporting secure protocols can be found in SWIFT Knowledge Base TIP 5021566.

[31] Advanced Encryption Standard

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		•	•	•

- Operator sessions and other session types (for example, admin or maintenance) have an inactivity lock-out feature that limits the session to the minimal timeframe necessary to perform business-as-usual duties.
- If the inactivity lock-out is not implemented at the application level, it should be implemented at the operating system-level of the application, or on the jump server.

[32] Elliptic Curve Diffie-Hellman Ephemeral

2.7 Vulnerability Scanning

Control Type: Mandatory / Advisory for B	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Identify known vulnerabilities within the local SWIFT environment by implementing a regular vulnerability scanning process and act upon results.

In-scope components:

- Jump server
- [Advisory : General purpose operator PCs as per the optional enhancement]
- Secure zone: all SWIFT-related applications and operating systems including also dedicated operator PCs
- [Advisory : Local or remote (hosted and/or operated by a third party) Virtualisation platform (also referred as the hypervisor) hosting SWIFT-related VM's and their management PCs as per optional enhancement]
- [Advisory A1/A2/A3: Middleware server (such as IBM® MQ server or similar) utilised to exchange with SWIFT-related components]
- [Advisory A4: Customer connector]

Risk Drivers:

- Exploitation of known security vulnerabilities

Implementation Guidance

Control Statement:

Secure zone including dedicated operator PC systems are scanned for vulnerabilities using an up-to-date, reputable scanning tool and results are considered for appropriate resolving actions.

Control Context:

The detection of known vulnerabilities allows vulnerabilities to be analysed, treated, and mitigated. The mitigation of vulnerabilities reduces the number of pathways that a malicious actor can use during an attack. A vulnerability scanning process that is comprehensive, repeatable and performed in a timely manner, is necessary to continuously detect known vulnerabilities and to allow for further action.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- Vulnerability scanning is performed at least annually or after any significant change to the environment (for example, introduction of new servers or components and network design change modifying/increasing the range of in-scope components).
  - Vulnerability scanning tools are from a reputable vendor and updated with scan profiles within one month prior to scanning.
  - The most appropriate type of vulnerability scanning (such as using credentials or black-box) is selected for the environment. Any administrative credentials used for scanning are appropriately protected.
  - Sufficient risk-based safeguards are in place to minimise any operational impact (for example, running scans in safe mode, or omitting systems that may be negatively affected from the scan).
- Beyond vulnerability identification through scanning, all penetration tests or effective vulnerability tests on or through SWIFT-related services and products are consistent with the SWIFT Customer Testing Policy.

Control Type: Mandatory / Advisory for B	Applies to architecture:	A1→A3	A4	B
		●	●	●

- The outcome of the vulnerability scanning is documented (with restricted access) and analysed for appropriate action and remediation (such as applying security updates in line with control 2.2).
- Once per quarter, month or ideally real-time scanning is recommended.

Optional Enhancements:

- Vulnerability scanning includes network components (such as routers and switches).
- Vulnerability scanning includes the general purpose operator PCs used to connect to local or service provider's SWIFT related infrastructure. As an alternative, security patches are regularly applied on the general purpose operator PCs. In the latter case, only supported and regularly patched applications are deployed on those PCs.
- Vulnerability scanning possibly includes the local or remote (hosted and/or operated by a third party) Virtualisation platform hosting the SWIFT-related VM's.

2.8A Critical Activity Outsourcing

Control Type: Advisory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Ensure protection of the local SWIFT infrastructure from risks exposed by the outsourcing of critical activities.

In-scope components:

- Organisational control applicable when outsourcing critical SWIFT related activities to a third party or a service provider.

Note: This control remains strongly recommended even when the activities being outsourced are not critical.

Risk Drivers:

- Exposure to sub-standard security practices

Implementation Guidance

Control Statement:

Critical outsourced activities are protected, at a minimum, to the same standard of care as if operated within the originating organisation.

Control Context:

When critical activities are outsourced to third parties (for example, external IT provider or cloud provider) or service providers (such as a service bureau or a Lite2 for Business Application provider), it is essential that at a minimum, the original standard of care for security is maintained (in addition to adherence to this security control framework) to ensure that no new weaknesses or vulnerabilities are introduced.

Note:

- SWIFT defines the following operations as critical:
  - Security management and change management of the hardware and software (including applications, operating system and underlying virtualised platform or infrastructure) supporting the SWIFT service,
  - RMA-related operations,
  - Accessing sensitive user data (for example, message content),
  - Monitoring of events containing sensitive user data,
  - Network management and configuration,
  - SWIFT-related transaction operations (for example, creation or modification of a financial transaction message within the messaging interface).

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- When outsourcing its SWIFT–related infrastructure or part of it to a third party (such as an external IT provider or a cloud provider such as in the case, when available, of the Digital Connectivity solution) acting on his behalf, the user remains responsible for the conformance with the security controls of this framework

Control Type: Advisory	Applies to architecture:	A1→A3	A4	B
		●	●	●

and must seek compliance from that third party.

- When the third party provides shared services to connect not-related SWIFT users, the third party must be registered to the Shared Infrastructure Programme (SIP) or the Alliance Lite2 for Business Applications (L2BA) programme. The user remains responsible for his own infrastructure, organisation and for implementing secure data flows towards the provider in line with the provider's specifications. The user is also responsible for monitoring his provider's compliance with the relevant SIP or L2BA programme[33]:
  - Service bureaux registered and compliant under the Shared Infrastructure Programme are listed in the SWIFT Partner Programme Service Bureau Directory
  - Lite2 for Business Applications providers registered and compliant under the related programme are listed in the Lite2 Business Applications Providers Directory
- Service Level Agreements (SLA) and a Non-Disclosure Agreement (NDA) are established with any third party or service provider to whom critical activities have been outsourced. These SLA define the standard of care under which those critical operations are carried out by the third party or the service provider.
- A risk assessment of the third party is conducted at the start of the engagement, and reviewed on a regular basis thereafter.

Note: SWIFT expects this control to become mandatory in a future version of this document.

[33] A provider remains listed as long as it is compliant. Should it be de-listed, it would be listed again once compliance is regained.

2.9A Transaction Business Controls

Control Type: Advisory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Restrict outbound transaction activity within the expected bounds of normal business.

In-scope components:

- GUI
- Secure zone: messaging interface
- Secure zone: communication interface
- Secure zone: SWIFT connector
- Customer connector

Note: Components are mentioned as the vector for outbound transaction business controls

Risk Drivers:

- Business conducted with an unauthorised counterparty
- Undetected anomalies or suspicious activity

Implementation Guidance

Control Statement:

Implement transaction detection, prevention and validation controls to restrict outbound transaction activity to within the expected bounds of normal business.

Control Context:

Implementing business controls that restrict SWIFT transactions to the fullest extent possible reduces the opportunity for the sending (outbound) and, optionally, receiving (inbound) of fraudulent transactions. These restrictions are best determined through an analysis of normal business activity. Parameters can then be set to restrict business to acceptable thresholds based on 'normal' activity.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- Implement controls that will detect, prevent, or additionally validate the flow of transactions against expected bounds of normal business (payment controls service). Examples of potential measures include:
  - A) Limiting traffic outside of business hours:
    - As business hours are organizational and business unit specific, multiple start and finish times (business hours) may need to be supported or no specific range can be defined for systems used in 24 hours basis.
    - Consider restricting SWIFT transaction submission and approval outside of normal business hours[34]. In cases of 24-hour centralised SWIFT processing, monitor transactions as appropriate to support business as usual: suspicious messages can be blended in with legitimate traffic.

[34] Limiting or dully controlling sessions outside of normal business flows can introduce delays allowing to intercept/recall fraudulous transactions before their potential immediate processing and ultimately cash-out.

Control Type: Advisory	Applies to architecture:	A1→A3 ●	A4 ●	B ●

- Consider enabling active SWIFTNet FIN sessions to business hours only (for example, automated logical terminal sessions log out at end of business day). In cases of 24-hour centralised SWIFT processing, monitor transactions as appropriate to support business as usual.

– B) Performing end of day and possibly intra-day validations:
  - Have a process in place to issue and check confirmation messages (for example, to check that the MT900 and MT910 confirmations match the transactions which have occurred on the accounts),
  - Reconciliation of the entity's accounting records with end-of-day statement messages (for example, MT 940 and MT 950),
  - Reconciliation is performed daily between the messages that are sent to/from the back office and to/from the SWIFT Network,

– C) Performing central checks on payments to spot potential abnormal behaviour:
  - Session numbers within the messaging interface are tracked to ensure that the sequential session numbering is intact with no unexpected gaps,
  - Monitor uncharacteristic transactions (for example, exceptionally high amounts or cumulative amounts, unusual beneficiaries, senders or currencies).

- Alternatively or in addition, independent reconciliation is undertaken with users' transaction data securely obtained from a secondary source (either internal or external such as SWIFT daily validation reports) or by verifying, the transaction is genuine with the emitter and/or the recipient.

Optional Enhancements:

- Application and operating system accounts are restricted from log-in attempts that occur outside of expected role-specific operational hours.
- Implement controls to restrict inbound transaction activity.

2.10 Application Hardening

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●		

Control Objective: Reduce the attack surface of SWIFT-related components by performing application hardening on the SWIFT-compatible messaging and communication interfaces and related applications.

In-scope components:

- Messaging interface
- Communication interface
- GUI
- SWIFTNet Link
- SWIFT connector

Risk Drivers:

- Excess attack surface
- Exploitation of insecure application configuration

Implementation Guidance

Control Statement:

All messaging interfaces and communication interfaces products within the secure zone are SWIFT-compatible. Application security hardening is conducted and maintained on all in-scope components.

Control Context:

Application hardening applies the security concept of “least privilege” to an application by disabling features and services that are not required for normal operations. This process reduces the application capabilities, features, and protocols that a malicious person may use during an attack. It also ensures that potential default credentials are changed.

In addition, SWIFT runs a Compatible Interface Programme to ensure interfaces are aligned with current practices and to give the customer additional assurance, guarantees, and better visibility regarding individual product capabilities. Upon successful validation of the test results by the SWIFT Test Authority, the interface is published in the Compatible Register. As per the SWIFT General Terms and Conditions, customers must use a SWIFT-compatible interface.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user’s implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- Ensure the messaging and communication interfaces are SWIFT-compatible (the list of compatible interfaces is published in the Compatible Register on www.swift.com).
  - The SWIFT-compatible interface should meet all the security conformance requirements (mandatory and advisory) defined in the SWIFT Compatible Interface Programme.
    - If some security conformance requirements are yet to be met, the user should upgrade to a SWIFT-compatible interface implementing at least the minimum mandatory security conformance requirements.
    - The interface provider should be contacted in case of doubt regarding the availability of some security functionalities or their proper configuration and usage.

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		•		

- All in-scope applications are hardened considering one or more of the following:
  - Vendor security, operational or configuration guidance (such as the SWIFT Alliance Security Guidance),
  - A local or regulator's standard security configuration or controls set of the same rigour as the vendor guidance.
- At a minimum, the application hardening process should:
  - Change default existing passwords,
  - Disable or remove unnecessary user accounts,
  - Disable or restrict unnecessary components, adaptors or connectivity methods,
  - Configure securely the adapters, connectivity methods or remote connections,
  - Remove unnecessary packages,
  - Adjust any default configurations known to be vulnerable.
- Deviations from the selected hardening configuration (i.e. a set of rules) are documented along with the justification for the deviation.

Optional Enhancements:

Additional applications installed on the systems hosting in-scope components and handling SWIFT-related data are also subject to considered application hardening as per the vendor recommendations.

2.11A RMA Business Controls

Control Type: Advisory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Restrict transaction activity to validated and approved business counterparties.

In-scope components:

- GUI
- Secure zone: messaging interface
- Connectors

Note: GUI, connectors and messaging interface are mentioned as the potential vector for RMA exchange and reporting

Risk Drivers:

- Business conducted with an unauthorised counterparty

Implementation Guidance

Control Statement:

Implement RMA controls to restrict transaction activity with effective business counterparties.

Control Context:

Implementing business controls that restrict SWIFT transactions to the fullest extent possible reduces the opportunity for both the sending and receiving of fraudulent transactions. These restrictions are best determined through an analysis of effective business relationships where RMA is a mechanism to prevent unwanted traffic on a service by controlling who can send traffic (and what type of messages can be exchanged through RMA Plus).

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- Relationship Management Application (RMA)
  - Appropriate know-your-customer principles and due diligence is performed during the creation and maintenance of RMA relationships.
  - RMA relationships are reviewed at least annually to ensure that obsolete (unused, dormant or unwanted) relationships are analysed and removed/revoked in a timely manner.

Optional Enhancements:

- Relationship Management Application Plus (RMA+)
  - Restrict the valid RMA relationships to the specific message types that are agreed with the counterparty.

Note: SWIFT expects this control to become mandatory in a next version of this document.

3 Physically Secure the Environment

3.1 Physical Security

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Prevent unauthorised physical access to sensitive equipment, workplace environments, hosting sites, and storage.

In-scope components:

- Dedicated and general purpose operator PC and when used jump server, including removable equipment
- Secure zone: all hardware
- Local or remote (hosted and/or operated by a third party) Hardware supporting virtualisation platform (also referred as the hypervisor) and hosting SWIFT-related VM's
- [Advisory A1/A2/A3: Middleware server (such as IBM® MQ server or similar) utilised to exchange with SWIFT-related components]
- [Advisory A4: Customer connector]

Note: Alliance Connect VPN boxes and their virtual instances (hosting systems or machines) are generally out of scope but expected to be in an environment with appropriate physical controls as described here below.

Risk Drivers:

- Lack of traceability
- Unauthorised physical access

Implementation Guidance

Control Statement:

Physical security controls are in place to protect access to sensitive equipment, hosting sites, and storage.

Control Context:

Implementing physical security controls protects against insider and external threats, and reduces opportunistic attacks enabled by access to physical systems.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- Security of Removable Equipment
  - Sensitive removable equipment (for example, PIN Entry Device (PED), PED keys, SWIFT-related smart cards, USB Tokens, TOTP Devices) is supervised or securely stored when not in use.
  - Sensitive removable equipment required for normal continuous operations (for example, hot swappable disks, HSM devices) are hosted in a data centre or, at a minimum, in a locked room.
  - Back-up media (for example, tapes) is physically secured.

Control Type: Mandatory	Applies to architecture:	A1→A3 ●	A4 ●	B ●

- Security of the Workplace Environment
  - Operator PCs are located in a secured workplace environment where access is controlled and granted only to employees and other authorised workers and visitors. A separate physical area for operator PCs accessing SWIFT systems is not required.
  - Printers used for SWIFT transactions are located in a secured workplace environment and their access is restricted.
  - USB and other external access points on operator PCs are disabled to the maximum extent possible, while still supporting operations (for example, when tokens are required to authenticate users or message operations).
- Security for Remote Workers (for example, teleworkers, "on call" operations staff)
  - A security policy is established to support expected use cases for remote workers. The following items are considered when establishing the policy:
    - Physical security of the expected teleworking environment,
    - Rules for personal equipment used for SWIFT business purposes (for example, personal PCs cannot be used to access the SWIFT infrastructure, however personal mobile devices can be used as a second authentication factor),
    - Security during use in public environments,
    - Security during public and private transport,
    - Equipment storage,
    - Unauthorised access to equipment (for example, from family or friends),
    - Remote access requirements (recommended VPN with multi-factor authentication),
    - Protection of mobile devices used for authentication, such as OTP (recommend enabling password and auto-lock features),
    - Compensating controls (for example, virtual desktop preventing local storage; full-disk encryption),
    - Reporting of security incidents (for example, theft) while working remotely.
- Security of the Server Environment
  - Servers are hosted in a data centre or, at a minimum, in a locked room with limited and controlled access (for example, using access control cards or biometrics).
    - Ideally, servers are rack-mounted. A risk assessment is conducted to determine if a separate and exclusive rack, or the locking of the rack, is appropriate based on the existing data centre physical access controls.
  - The server environment has video surveillance with movement detection and recording equipment. The implementation of video surveillance recording and retention of images comply with applicable laws and regulations[35]. Ideally, images are retained for at least three months.
  - No physical reference to SWIFT on servers (for example, labels).
  - External ports (for example, USB, serial bus) on servers are disabled to the maximum extent possible while still supporting operations.
- Physical Access Logging and Review
  - Physical access to sensitive equipment areas (for example, data centre, secured storage) is logged.
  - Physical access logs are available for audit and investigations, and are retained for a minimum of 12 months and in compliance with applicable laws and regulations.
  - Physical access is promptly revoked (or modified) when an employee changes roles or leaves the organisation.
  - Physical access control lists are reviewed at least annually.

[35] Such as the “Guidelines 3/2019 on processing of personal data through video devices”, local Data Protection Act/code of practice or Laws related to video surveillance

4 Prevent Compromise of Credentials

4.1 Password Policy

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Ensure passwords are sufficiently resistant against common password attacks by implementing and enforcing an effective password policy.

In-scope components:

- Log-in to dedicated and general purpose operator PCs and when used jump server
- Secure zone: application and operating system accounts including as well network devices protecting the secure zone
- Local or remote (hosted and/or operated by a third party) Virtualisation platform (also referred as the hypervisor) hosting SWIFT-related VM's and their management PCs
- [Advisory A1/A2/A3: Middleware server (such as IBM® MQ server or similar) utilised to exchange with SWIFT-related components]
- [Advisory A4: Customer connector]
- Personal tokens and personal mobile devices used as possession factor for multi-factor authentication (see control 4.2)

Risk Drivers:

- Password cracking, guessing, or other computational compromise

Implementation Guidance

Control Statement:

All application and operating system accounts enforce passwords with appropriate parameters such as length, complexity, validity, and the number of failed log-in attempts. Similarly, personal tokens and mobile devices enforce passwords or Personal Identification Number (PIN) with appropriate parameters.

Control Context:

Implementing a password policy that protects against common password attacks (for example, guessing and brute force) is effective for protecting against account compromise. Attackers often use the privileges of a compromised account to move laterally within an environment and progress the attack. Another risk is the compromise of local authentication keys to tamper with the integrity of transactions.

It is however important to recognise that passwords alone are generally not sufficient in the current cyber threat landscape. Users should consider this control in close relationship with the multifactor authentication requirement.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- A password policy covering also PIN settings is established, aligned to current industry standards or industry best practices, and defines the following criteria:
  - Password expiration,

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

- Password length, composition, complexity, and other restrictions,
- Password reuse,
- Lockout after failed authentication attempts, and remedy.
- Password requirements may be modified as necessary for specific use cases:
  - In combination with a second factor (for example, one-time password),
  - Authentication target (for example, operating system, application, mobile device, token),
  - Type of account (general operator, privileged operator, application-to-application account or local authentication keys).

More good practice guidelines on password and PIN parameter settings can be found in SWIFT Knowledge Base TIP 5021567 and 5022038.

- The password policy is developed in consideration of known password-based vulnerabilities in the computing environment. For example, requiring a 15+ character password for Windows systems prevents Windows from computing the highly vulnerable LM (LAN Manager) password hash.
- The established password policy is enforced through technical means (for example, through Active Directory group policy, or within application settings) where possible.
- Effectiveness of the password policy is reviewed regularly (recommended annually).
- System settings related to password management and storage are aligned to industry and vendor best practices (for example, enabling the "NoLMHash" registry setting in Windows).
- Passwords used for secure zone systems are significantly more exposed if the passwords are stored in authentication systems outside of the secure zone (for example, an enterprise Active Directory). Instead, passwords for secure zone systems are, to the fullest extent possible, stored only within the zone (for example, in an Active Directory for production systems) as described in the guidance for the design of the secure zone or another existing secure zone that has similar controls.

Note: It is important that users implement strong passwords, and preferably strong authentication, for all systems used within the end-to-end transaction chain, and not limit these controls to only the SWIFT infrastructure.

4.2 Multi-factor Authentication

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Prevent that a compromise of a single authentication factor allows access into SWIFT systems or applications, by implementing multi-factor authentication.

In-scope components:

Depending on implementation:

- Dedicated operator PC log-in
- Operator access to jump server
- Operator log-in process to the messaging interface (incl. hosted DB), communication interface or service provider SWIFT-related application
- Operating system hosting the messaging interface (incl. hosted DB) and communication interface
- Access to the remote SWIFT infrastructure (hosted and/or operated by a third party)

Risk Drivers:

- Credential replay
- Password cracking, guessing, or other computational compromise
- Password theft

Implementation Guidance

Control Statement:

Multi-factor authentication is used for interactive user access to SWIFT-related applications and operating system accounts.

Control Context:

Multi-factor authentication requires the presentation of two or more of the below mentioned common authentication factors:

- Knowledge factor (something the operator knows), typically, a password.
- Possession factor (something the operator has), typically:
  - connected tokens (for example, USB tokens, smartcards),
  - disconnected tokens (for example, one-time password generators using operators' mobile phone, RSA token or Digipass).
- Inherence factor (something the operator is), typically, biometrics such as fingerprint, retina scans or voice recognition.

Implementing multi-factor authentication provides an additional layer of protection against common authentication attacks (for example, shoulder surfing, password re-use, or weak passwords) and provides further protection from account compromise for malicious transaction processing . Attackers often use the privileges of a compromised account to move laterally within an environment and progress an attack.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- When implementing multi-factor authentication, the following principles apply:
  - When based on a knowledge factor (typically a password) combined with a possession factor (a mobile device), the device used for the second factor must not be the same as the device used to enter the first factor. As such, using an app to generate the second factor on the same device/PC used to enter the first factor (password) is not deemed sufficient to access the local SWIFT systems.
    - Second factor solutions based on a possession factor include (not exhaustive list): TOTP, RSA SecurID, Digipass, Mobile App, Transaction Authentication Number (TAN) Table, personal USB token. Solution to be selected as per user's own risk management.
  - An inherence factor is more safely combined with a possession factor than with a knowledge factor.
- Multi-factor authentication is implemented at least on one authentication stage/step faced by the system administrator or the end user when accessing a SWIFT application or its hosting system:
  - For operating system administrators when accessing the hosting system:
    - At the secure zone boundary (jump server),
    - At the dedicated operator PC log-in (within the secure zone).
  - For end users in descending order of security robustness when accessing the SWIFT application:
    - On the individual SWIFT applications (on the browser-based GUI, on the messaging interface, or on the communication interface),
    - At the secure zone boundary (jump server),
    - At the dedicated operator PC log-in (i.e. within the secure zone).
- Multi-factor authentication is implemented for remote user administrative access, generally for VPN authentication.
- Multi-factor authentication systems are significantly more exposed if the authentication credentials are stored outside of the secure zone (for example, within an enterprise Active Directory). If feasible, the authentication system supporting the multi-factor solution is located within the secure zone.
- The authentication factors presented are individually assigned and support individual accountability of access to services, operating system, and applications.
- If single sign-on (for example, SAML) is implemented, then a second factor is still required at the single sign-on, or at a later stage.
- MFA is also to be presented when accessing, at least for transaction processing[36], a SWIFT related service, application or component operated by a service provider (such as a service bureau, an L2BA provider or intermediate actor).

Note: All SWIFT and SWIFT-compatible third-party vendor messaging and communication interfaces must support or embed multi-factor authentication.

[36] such as posting, creating, approving or modifying transactions or user entitlements.

5 Manage Identities and Segregate Privileges

5.1 Logical Access Control

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Enforce the security principles of need-to-know access, least privilege, and segregation of duties for operator accounts.

In-scope components:

- All operator accounts (on for example, local or remote virtualisation platform and their management PCs, also referred as the hypervisor, hosting SWIFT-related VM's, VM's themselves, jump server, dedicated operator PCs, operating systems, applications and HSM)
- [Advisory : All operator accounts on the customer connector and middleware server (such as IBM® MQ server or similar) utilised to exchange with SWIFT-related components]

Risk Drivers:

- Excess privilege or access
- Segregation of duty violations
- Unauthorised access

Implementation Guidance

Control Statement:

Accounts are defined according to the security principles of need-to-know access, least privilege, and segregation of duties.

Control Context:

Applying the security principles of (1) need-to-know, (2) least privilege, and (3) segregation of duties is essential to restricting access to the local SWIFT infrastructure. Effective management of operator accounts reduces the opportunities for a malicious person to use accounts as part of an attack.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

A logical access control policy is documented and enforced to consider the following principles:

- Need-to-know.
  - Only operators (end users and administrators) who have a continuing requirement to access the secure zone are permitted to have accounts within the secure zone.
  - Privileges are only assigned to an operator with a validated need-to-know (for example, system setup ensures that operators only have access to the information, files, and system resources necessary for their defined tasks). Access to other system functions is disabled.
- Least Privilege.
  - The system setup ensures that user and administrator privileges are controlled in a way that allows all privileges to be tailored to individual needs.
  - Accounts are granted only the privileges that are required for normal, routine operation. Additional

Control Type: Mandatory	Applies to architecture:	A1→A3 ●	A4 ●	B ●

privileges are only granted on a temporary basis.

- Segregation of Duties and 4-Eyes.
  - Vendor documented guidance on role separation is followed in vendor-specific documentation.
  - Sensitive duties are separated. This means that some roles cannot be represented by the same individual, such as:
    - Transaction submission and transaction approval
    - Application Administrator and security officer roles
    - Network and operating system administrators.
  - Sensitive permissions are separated to prevent by-passing the 4-Eyes principle. At a minimum, this requirement applies to access control and security configuration operations on the following components: Messaging and Communication Interface, HSMs, SWIFTNet Online Operations Manager, and Secure Channel.
- Account Review and Revocation
  - Privileges are promptly revoked when an employee changes roles or leaves the organisation.
  - Accounts are reviewed at least annually (ideally more frequently) and adjusted as required to enforce access security principles.
- An emergency procedure to access privileged accounts is documented for use when authorised persons are unavailable due to unexpected circumstances:
  - Any operational use of the procedure is logged.
  - Access to the emergency privileged accounts is controlled. The usage is logged and the password is changed after emergency use.

5.2 Token Management

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Ensure the proper management, tracking, and use of connected hardware authentication or personal tokens (if tokens are used).

In-scope components:

- Connected hardware authentication or personal tokens used for SWIFT operations or secure zone access
- PIN Entry Device (PED) used for HSM operations

Risk Drivers:

- Authentication token theft
- Lack of traceability
- HSM management misused

Implementation Guidance

Control Statement:

Connected hardware authentication or personal tokens are managed appropriately during assignment, distribution, revocation, use, and storage.

Control Context:

The protection of connected hardware authentication or personal tokens is essential to safeguarding the related operator or system account and reinforces good security practice, providing an additional layer of protection from attackers.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- A controlled process is used for the assignment and distribution of connected hardware or personal tokens used for SWIFT operations (for example USB token, HSM token, smart card).
- Token assignment is reviewed at least annually (ideally more frequently).
- Personally assigned hardware tokens are revoked when the individual no longer requires access and should possibly be recalled (for disposal or reassignment as appropriate).
- A record is maintained of assigned hardware tokens ownership.
- Hardware tokens are physically removed from the system and secured or supervised when not in use.
- When a remote PED is used, the following security practices apply:
  - PED keys must be stored and only accessible by relevant staff (originals and copies should be stored in a safe and access is tracked)
  - Although the HSM PED keys are not personally assigned, usage should be controlled, tracked and monitored. In case a PIN is set on the PED keys and a person with access to these keys and PIN is leaving the company, the PIN codes should be changed
  - The flows to the HSM must be secured as per the Alliance Security Guidance considering also the CSP FAQ (SWIFT Knowledge Base TIP 5021823) to properly establish and manage the connection.

5.3A Personnel Vetting Process

Control Type: Advisory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Ensure the trustworthiness of staff operating the local SWIFT environment by performing personnel vetting in line with applicable local laws and regulations.

In-scope components:

- All personnel (such as employees, agents, consultants and contractors) with operational (maintenance or administration) access to SWIFT-related systems, customer connector or middleware servers and local or remote virtualisation platform hosting SWIFT-related VM's, customer connector VM's or middleware servers VM's.

Risk Drivers:

- Untrustworthy staff or system operators

Implementation Guidance

Control Statement:

Staff operating the local SWIFT infrastructure are vetted prior to initial appointment in that role and periodically thereafter.

Control Context:

A personnel vetting process, internal or external clearance, provides additional assurance that operators or administrators of the local SWIFT infrastructure are trustworthy, and reduces the risk of insider threats.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

To the extent permitted under applicable laws and regulations and to the extent the information is available, the below guidelines and specified verifications are recommended:

- All in-scope personnel are vetted at least every 5 years.
  - For those already in the role and not yet vetted, a catch-up process is gradually organised as part of the periodic vetting (sometimes also referred to as re-vetting)
- The vetting process for initial employment includes the following verifications (to be conducted in accordance with applicable local laws and regulations[37]):
  - Identity verification,
  - Confirmation of full details of qualifications,
  - Confirmation of previous employment history,
  - Details of any past or pending civil or criminal proceedings against the employee,
  - Validation of any involvement in external businesses that could result in a conflict of interest,

[37] Including, where applicable, social concertation

Control Type: Advisory	Applies to architecture:	A1→A3 ●	A4 ●	B ●

- Financial credit verification.

- The periodic vetting process includes the following verifications (to be conducted in accordance with applicable local laws and regulations[29]):
  - Details of any pending civil or criminal proceedings against the employee,
  - Validation of any involvement in external businesses that could result in a conflict of interest,
  - Financial credit verification.

5.4 Physical and Logical Password Storage

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Protect physically and logically repository of recorded passwords.

In-scope components:

Accounts and passwords defined on the following components:

- Dedicated and general purpose operator PC and when used jump server: for operating system access
- Dedicated and general purpose operator PC and when used jump server: interactive user session
- Secure zone: all applications, operating systems, HSM and related tokens and network components
- Local or remote (hosted and/or operated by a third party) Virtualisation platform (also referred as the hypervisor) hosting SWIFT-related VM's
- [Advisory A1/A2/A3: Middleware server (such as IBM® MQ server or similar) utilised to exchange with SWIFT-related components]
- [Advisory A4: Customer connector]
- SWIFTNet Online Operations Manager and swift.com

Risk Drivers:

- Password theft

Implementation Guidance

Control Statement:

Recorded passwords are stored in a protected physical or logical location, with access restricted on a need-to-know basis.

Control Context:

The secure storage of recorded passwords (repository) ensures that passwords are not easily accessible to others, thereby protecting against simple password theft. Common unsecure methods include (unexhaustive list): recording passwords in a spreadsheet or a text document saved in clear on a desktop or in a shared directory or a server, saved in a mobile phone, written/printed on a post-it or a leaflet.

This control covers the storage of emergency, privileged or any other account passwords. All accounts have to be considered because (i) combination of compromised not privileged accounts can be damageable, such as transaction creator account and approver account (ii) even monitoring accounts provide valuable information during the reconnaissance time.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- Passwords written on physical media are protected via:
  - Placement inside a sealed, tamper-evident security envelope,
  - Storage in a safe,
  - Logging of access to the storage location and which account's password was accessed.
- Passwords stored logically (digitally) are protected via:
  - Encryption-at-rest or obfuscation (that is, no plain-text storage),

  - Authenticated access to the storage location, ideally with logging of access.
- Passwords are not recorded in user manuals or other operational material unless the password is stored in accordance with the guidance above.
- If emergency access is granted to an operator who under normal conditions would not have access, the password is changed immediately thereafter, and optionally also the combination to the storage safe.
- Passwords are not hardcoded in scripts or other software code.

Optional Enhancement:

The safe is certified through, for example, Underwriters Laboratories (UL) Class TL or EN-1143-1 certification.

6 Detect Anomalous Activity to Systems or Transaction Records

6.1 Malware Protection

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Ensure that local SWIFT infrastructure is protected against malware and act upon results.

In-scope components:

- Dedicated and general purpose operator PC and when used jump server - Windows operating systems
- Management PCs of local or remote (hosted and/or operated by a third party) Virtualisation platform
- Secure zone: SWIFT-related servers - Windows operating systems
- [Advisory A1/A2/A3: Middleware server (such as IBM® MQ server or similar) utilised to exchange with SWIFT-related components – Windows operating systems]
- [Advisory A4: Customer connector]

Risk Drivers:

- Execution of malicious code
- Exploitation of known security vulnerabilities

Implementation Guidance

Control Statement:

Anti-malware software from a reputable vendor is installed, kept up-to-date on all systems, and results are considered for appropriate resolving actions.

Control Context:

Malware is a general term that includes many types of intrusive and unwanted software, including viruses. Anti-malware technology (a broader term for anti-virus) is effective in protecting against malicious code that has a known digital or behaviour profile.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- On-access anti-malware scanning (also known as real-time or background scanning) is performed on all in-scope systems. On-demand full scanning is scheduled at least on a weekly basis for operator PCs (ideally on a daily basis). On-demand full scanning should be scheduled regularly for servers in line with business and operational constraints. For performance reasons, full scans are performed at times of low usage and/or outside of business hours.
- The scope of the scanning should include all files of the systems in scope. Exclusion of elements or directory from scanning is subject to risk assessment considering user's infrastructure setup, internal security requirements and policies, the product capabilities and the following principles:

  - Software (such as exe, libraries, scripts) and static data (such as configuration files) are expected to be scanned on-access or at installation, and regularly thereafter, when complemented with a run time integrity mechanism (in line with the software integrity check depicted in control 6.2) allowing the identification of file changes or unexpected additions.
  - Database server content (data files) can be excluded from the scanning when the data has been checked, validated and scanned at least once before being stored.
- Anti-malware software from a reputable vendor is installed on all computing platforms and updated in line with the scanning frequency.
- Systems that fail to update their profiles or run scheduled scans are detected and corrected.
- Anti-malware software is tested for compatibility with the operational environment.
- Anti-malware software is configured in prevent mode if possible, after assessing for operational impact. It is recommended to configure the anti-malware software to quarantine suspicious files and raising an alarm to user's security department instead of immediately deleting them. This allows the user's security department to investigate the alert and possibly prevent future 'false positives' while allowing the recovery of files in case it is confirmed they are legitimate.
- Files to be sent should be scanned at least once at any stage/step of their internal processing and ideally as close as possible to their transfer into the SWIFT network. This is to ensure that such files do not contain viruses or malware that may create risks for the sender, for SWIFT, or for the receiver.
- Endpoint Protection Platform (EPP) solution, combined or not with Endpoint Detection and Response (EDR) offering similar control on the infrastructure can be considered as a valid implementation.

Optional Enhancements:

- Anti-malware systems use a combination of signature-based and heuristic-based capabilities.
- Anti-malware solutions are, when technically possible, implemented on non-Windows systems.
- On-demand full scanning is scheduled at least on a weekly basis on servers.

6.2 Software Integrity

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●		

Control Objective: Ensure the software integrity of the SWIFT-related applications and act upon results.

In-scope components:

- Secure zone: SWIFT connector
- Secure zone: GUI to the messaging and communication interface
- Secure zone: messaging interface
- Secure zone: communication interface
- Secure zone: RMA
- Secure zone: SNL

Risk Drivers:

- Unauthorised system changes

Implementation Guidance

Control Statement:

A software integrity check is performed at regular intervals on messaging interface, communication interface, and other SWIFT-related applications and results are considered for appropriate resolving actions.

Control Context:

Software integrity checks provide a detective control against unexpected modification to operational software.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- Software integrity checks are conducted on in-scope components upon start-up, and additionally at least once per day.

  Options for implementation:

  - Integrated into the product,
  - Third-party file integrity monitoring (FIM) tool.
- Integrity check of downloaded software is conducted via verification of the checksum at the time of its deployment.

Optional Enhancements:

- An integrity check is performed in memory.
- An integrity check is performed at the operating system level.
- File Integrity Monitoring covers the products with integrated mechanisms.
- Systems within the secure zone implement application whitelisting on the operating system which allows only known and trusted applications to be executed.

6.3 Database Integrity

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●		

Control Objective: Ensure the integrity of the database records for the SWIFT messaging interface and act upon results.

In-scope components:

- Databases for messaging interface products

Note: this requirement is not relevant for Architecture A3 and not applicable for Architecture A1 if the infrastructure does not include a messaging interface.

Risk Drivers:

- Loss of sensitive data integrity

Implementation Guidance

Control Statement:

A database integrity check is performed at regular intervals on databases that record SWIFT transactions and results are considered for appropriate resolving actions.

Control Context:

Database integrity checks provide a detective control against unexpected modification to records stored within the database.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- Database integrity check functionality is enabled to ensure integrity at record level (checksum or signature of the records) and confirm that there are no gaps in sequential transaction numbering.

  Options for implementations:

  - Integrated into the messaging interface application,
  - Integrated into the database product.

Optional Enhancements:

- A full database integrity check is performed at regularly timed intervals, ideally every two weeks.
- The integrity check performs a full referential check on all records (for example, no orphan records between tables) and searches for any unexpectedly deleted records.
- A dedicated database instance is used for SWIFT purposes.

6.4 Logging and Monitoring

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Record security events and detect anomalous actions and operations within the local SWIFT environment.

In-scope components:

- Data exchange layer: network
- Dedicated and general purpose operator PC or when used jump server: operating system
- Secure zone: SWIFT connector
- Secure zone: GUI to the messaging and communication interface
- Secure zone: all server applications and operating systems
- Secure zone: network and HSM
- Secure zone: database
- Local or remote (hosted and/or operated by a third party) Virtualisation platform (also referred as the hypervisor) hosting SWIFT-related VM's
- [Advisory A1/A2/A3: Middleware server (such as IBM® MQ server or similar) utilised to exchange with SWIFT-related components]
- [Advisory A4: Customer connector]

Risk Drivers:

- Lack of traceability
- Undetected anomalies or suspicious activity

Implementation Guidance

Control Statement:

Capabilities to detect anomalous activity are implemented, and a process or tool is in place to frequently store and review logs.

Control Context:

Developing a logging and monitoring plan is the basis for effectively detecting abnormal behaviour and potential attacks. As the operational environment becomes more complex, so will the logging and monitoring capability needed to perform adequate detection. Simplifying the operational environment will enable more straightforward logging and monitoring.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- Overall goals for logging and monitoring:
  - Implement a plan for logging of security-relevant activities and configure alarms for suspicious security events (when supported by the application).
  - Implement a plan for monitoring of security events in logs and for monitoring of other data (for example,

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

real-time business activities through the GUI), and establish a plan to treat reported alarms.

- All logging and monitoring activity complies with applicable laws and regulations, and employment contracts which supersede any implementation guidance.
- Logging:
  - Logging capabilities are implemented to detect abnormal usage within the secure zone as well as any attempts to undermine the effectiveness of controls within the secure zone.
  - Logs provide traceability of account usage to the appropriate individual.
  - Messaging and communication interface application audit logs are retained for no less than 12 months and are sufficiently protected from an enterprise administrator-level compromise (for example, log files are transferred to a separate system with different system administrator credentials).
  - Operator PC, firewall and database audit logs are retained for no less than 31 days.
  - Minimum logs to be recorded include:
    - Command line history for privileged operating system accounts on servers,
    - Messaging and communication interface application and operating system logs which detail abnormal system behaviour (for example, activity outside normal business hours, multiple failed log-in attempts, authentication errors, changes to user groups),
    - Firewall logs,
    - Database logs (if available, and as a minimum in the case of hosted database solutions).
- Monitoring:
  - Procedures are in place to identify suspicious log-in activities into any privileged operating system or application accounts within the secure zone.
  - Monitoring processes are in place to review server, application and database monitoring data of the secure zone either daily via human reviews or via automated monitoring with alerting.
  - Monitoring processes are in place to review network monitoring data on a regular basis.
  - Unusual or suspicious activity is reported for further investigation to the appropriate security team.

Optional Enhancements:

- A centralised logging capability is implemented, minimising the number of log locations to be inspected.
- Session recording is implemented to record all activity conducted by privileged accounts on SWIFT secure zone servers.

6.5A Intrusion Detection

Control Type: Advisory	Applies to architecture:	A1→A3	A4	B
		●	●	

Control Objective: Detect and prevent anomalous network activity into and within the local or remote SWIFT environment.

In-scope components:

- Network (data exchange layer reaching the SWIFT-related components and inside the secure zone)
- Remote (hosted and/or operated by a third party) Virtualisation platform supporting the user SWIFT environment

Risk Drivers:

- Undetected anomalies or suspicious activity

Implementation Guidance

Control Statement:

Intrusion detection is implemented to detect unauthorised network access and anomalous activity.

Control Context:

Intrusion detection systems are most commonly implemented on a network (NIDS)[38] – establishing a baseline for normal operations and sending notifications when abnormal activity on the network is detected. As an operational network becomes more complex (for example, systems communicating to many destinations, Internet access), so will the intrusion detection capability needed to perform adequate detection. Therefore, simplifying network behaviour is a helpful enabler for more straightforward and effective intrusion detection solutions.

Host intrusion detection systems (HIDS) are intended to protect the individual system they are implemented on in addition to detect as well as the network packets on its network interfaces, similar to the way an NIDS operates.

Intrusion detection systems (NIDS or HIDS) often combine signature- and anomaly-based detection methods. Some systems have the ability to respond to any detected intrusion (for example, terminating the connection).

Endpoint detection and response (EDR) is an emerging technology that addresses the need for continuous monitoring and response to advanced threats by detecting suspicious activities and (traces of) other problems on hosts/endpoints. This technology is more frequently combined with endpoint protection platform (EPP) that focuses at the device level.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- The intrusion detection system is configured to detect anomalous activity within the secure zone and at the boundary of the secure zone. This can be achieved through NIDS and/or HIDS depending on the network configuration (for instance large VLAN would better benefit of NIDS; isolated islands segregating systems may favour HIDS on those systems). The EDR solution can also be considered.
- Network activity to be tracked for intrusion detection analysis may include:
  - Inbound and outbound connections during non-business hours,
  - Unexpected connections from the secure zone towards other systems within or outside of the perimeter

[38] Network Intrusion and Detection System

of the SWIFT secure zone,

- Unexpected port or protocol use (for example, P2P).

- The system has a repeatable process to regularly update known intrusion signatures.
- If an intrusion is detected, an alarm is raised and, if the tool permits, a defence mechanism is triggered manually or automatically.
- Detected intrusions are managed via the standard incident response process.

Optional Enhancement:

- Intrusion detection systems have the capability to inspect encrypted flows.

Considerations for alternative implementations:

Institutions with a high level of security information and event management (SIEM) maturity within their organisation may consider extending, as per the control 6.4, their SIEM for real-time analysis of network and systems intrusion.

7 Plan for Incident Response and Information Sharing

7.1 Cyber Incident Response Planning

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Ensure a consistent and effective approach for the management of cyber incidents.

In-scope components:

- Organisational control

Risk Drivers:

- Excess harm from deficient cyber readiness

Implementation Guidance

Control Statement:

The user has a defined and tested cyber incident response plan.

Control Context:

Availability and adequate resilience is of key importance to the business. In this respect, defining and testing a cyber incident response plan is a highly effective way of reducing the impact and duration of a real cyber incident. As lessons are learnt either by testing this plan, or through real incidents, it is essential to apply these learnings and improve the plan. Additionally, planning for the sharing of threat and incident information is critical to assisting the broader financial community in implementing effective protections against cyber attacks.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- The user has developed and annually updates a cyber incident response plan. A formal backup and recovery plan exists for all critical business lines to support incident response activities.
  - The cyber incident response plan includes up-to-date contact details (internal and external when using third parties or service providers) and escalation timers. Such a plan has to incorporate:
    - The Cyber Security Incident - Recovery roadmap that provides a non-exhaustive list of steps or actions that a customer must follow in case of a cyber security breach and refer to SWIFT Support. Details are outlined in SWIFT-ISAC Bulletin #10047.
    - Internal security policies, laws, and regulations within a user's jurisdiction must be adhered to and considered in the cyber incident response planning.
- As a minimum, the plan is reviewed on an annual basis, and tested at least every two years ensuring safe recovery of critical business operations with minimised outage time after a cybersecurity incident.
- The cyber incident response plan includes steps to:
  - Promptly notify the appropriate internal stakeholders and leadership,
  - Promptly notify the relevant external organisational stakeholders (typically, regulator(s), supervisor(s), law enforcement authorities),

Control Type: Mandatory	Applies to architecture:	A1→A3 ●	A4 ●	B ●

- Promptly notify the SWIFT Customer Support Centre through the default channel and to comply with other obligations applicable to users in case of a security incident including the obligation to cooperate and provide forensic materials as may be required by SWIFT,
- Promptly contain or isolate the impacted system to limit the exposure of the attack whilst still be able to identify rogue activities,
- Involve skilled cybersecurity professionals to identify and address the cyber incident. It is the user's responsibility to take prompt corrective action to investigate, clean the full infrastructure and resume secure operations as soon as possible,
- Review the correctness of the user current attestation(s) and, as applicable under the SWIFT Security Controls Policy, invalidate such attestation(s) and submit new attestation(s),
- Conduct post-incident problem analysis to identify and remediate vulnerabilities,
- Fully document the incident.

- The user has a documented plan for the timely sharing of threat information to intelligence-sharing organisations, law enforcement/local regulators (as required in each users' jurisdiction) and to SWIFT. Sharing of threat information may potentially support root cause analysis and sharing of anonymised Indicators of Compromises (IOC) with the community.
- Information to be shared is first evaluated to ensure compliance with applicable laws and regulations (for example, privacy of personal data, confidentiality of investigations) and protects against the unintended sharing of sensitive data or data beyond the relevance of the incident.
- The user has the capability to consume threat intelligence shared by SWIFT, for example in the form of IOCs. The user has procedures in place to:
  - Ensure the information is distributed to the correct contacts within the organisation,
  - Block traffic to/from IP-addresses/URLs mentioned in the IOCs.

Optional Enhancement:

- User can integrate the SWIFT ISAC automated feed solution in its environment.

7.2 Security Training and Awareness

Control Type: Mandatory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Ensure all staff are aware of and fulfil their security responsibilities by performing regular security training and awareness activities.

In-scope components:

- All personnel (such as employees, agents, consultants and contractors) with access to SWIFT systems (usage, maintenance or administration)

Risk Drivers:

- Increased security risk from improperly trained staff

Implementation Guidance

Control Statement:

Annual security awareness sessions are conducted for all staff members including role-specific training for SWIFT roles with privileged access.

Control Context:

A security training and awareness programme encourages conscious and appropriate security behaviour of employees and administrators, and generally reinforces good security practice. In addition, it is particularly important that privileged access users have appropriate knowledge and expertise.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- Staff complete annual security awareness and training. Topics may include:
  - SWIFT-related products and services training (for example, via SWIFTSmart which is available to all users),
  - Cybersecurity threat awareness within the financial services industry or relevant to staff's role and responsibilities,
  - Risks related to internet usage or deployment in the cloud
  - Password security and management,
  - Device security,
  - Safe operating habits (for example, spam and phishing, including "spear[39]" phishing identification, downloading files, browsing practices),
  - Reporting of suspicious events and activities,
  - Detection and response to cyber incidents in line with the organisation's response plan,
  - Internal or external programme that optionally allows staff to obtain and maintain certifications.
- Training is delivered through the most appropriate channel, including computer-based training, classroom training, webinars.

[39] Spear phishing is an email or electronic communications scam targeted towards a specific individual, organization or business.

- Persons who have access to SWIFT applications, data, certificates, network, etc. have an adequate knowledge level and are aware of the pertinent cyber risks (for example, through IOCs published by SWIFT), best practice behaviours, and processes.

Optional Enhancement:

- Social engineering testing, including fake phishing emails campaign, is performed to challenge and enhance the security awareness.

7.3A Penetration Testing

Control Type: Advisory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Validate the operational security configuration and identify security gaps by performing penetration testing.

In-scope components:

- Dedicated and general purpose operator PC or when used jump server: all hardware, software, and network
- Data exchange layer (the entry points to the secure zone or flows established to the secure zone components should be considered)
- Customer connector
- Secure zone: all hardware, software, and network components (in line with the SWIFT Customer Testing Policy, SWIFT-specific applications and SWIFT-central services such as SWIFTNet InterAct, FileAct FIN, SWIFTNet Instant or WebAccess are not in scope)
- Remote (operated by a third party) Virtualisation Platform (also referred as the hypervisor) hosting SWIFT-related VM's and their management PCs

Risk Drivers:

- Unknown security vulnerabilities or security misconfigurations

Implementation Guidance

Control Statement:

Application, host, and network penetration testing is conducted towards the secure zone and the operator PCs or, when used, the jump server.

Control Context:

Penetration testing is based on simulated attacks that use similar technologies to those deployed in real attacks. It is used to determine the pathways that attackers might use, and the depth to which the attackers may be able to access the targeted environment. Conducting these simulations is an effective tool for identifying weaknesses in the environment which may require correction, improvement, or additional controls.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- The organisation uses a risk-based approach to determine the preferred scope (for example, the secure zone, or a specific server including potential other services supporting the secure zone), method (for example, white box test, black box test) and attack origin (for example, internal, from within or outside the secure zone, or external attack) for the test.
- Penetration testing is performed at least every 2 years, and ideally as well after significant changes to the environment (for example, introduction of new/different servers, new operating systems, underlying technology such as virtualisation or new network device technology, network design change).
- Penetration testing is carefully planned and performed to avoid potential availability or integrity impacts.
- Penetration testing is performed by expert staff independent from the team in charge of the SWIFT infrastructure (internal Red Team or external resources).

- Network component and host penetration testing (for example, rule bases and configurations review) are performed in the service production environment or in pre-production environment replicating the live environment.
- Sufficient safeguards are in place to minimise any operational impact from conducting the penetration test.
- The outcome of the penetration testing is documented (with restricted access) and used as an input for the security update process.

Note: The CSP FAQ (SWIFT Knowledge Base TIP 5021823) provides additional details on the scoping and the testing scenarios to consider.

Optional Enhancement:

Penetration testing is performed on SWIFT-specific applications while adhering to the SWIFT Customer Testing Policy. This SWIFT-specific application penetration testing is performed in the testing environment to avoid potential availability or integrity impacts.

7.4A Scenario Risk Assessment

Control Type: Advisory	Applies to architecture:	A1→A3	A4	B
		●	●	●

Control Objective: Evaluate the risk and readiness of the organisation based on plausible cyber attack scenarios.

In-scope components:

- Organisational control (people, processes and infrastructure) to be also met by third party operating a remote virtualisation platform (also referred as the hypervisor) hosting SWIFT-related VM's

Risk Drivers:

- Excess harm from deficient cyber readiness
- Unidentified sensitivity to cyber exposure

Implementation Guidance

Control Statement:

Scenario-based risk assessments are conducted regularly to improve incident response preparedness and to increase the maturity of the organisation's security programme.

Control Context:

Scenario-based risk assessments, including cyberwar games, test various attacks performed by all types of unauthorised individuals on the existing systems and processes targeting the hosted SWIFT-related infrastructure. Scenario-based risk assessments are a mix of technical and business driven exercises performed as part of the institution risk management.

Such assessment considers the following non-exhaustive threats: end-user impersonation, message tampering, message eavesdropping, third-party software weaknesses, compromising systems or Denial of Service (DoS) attacks affecting service availability. Results of the assessment and existing mitigations help to identify areas of risks that may require future actions, risk mitigations or update of the cyber incident response plan.

Identified actions, mitigations, or updates have to be reported and followed up for closure according to their criticality as per the Information Security Risk Management (ISRM) process.

Several ISRM frameworks exist and can be consulted (for example, on NIST, ENISA, COBRA or ISO sites or from a local or regulator's standard or controls set of the same rigour as the industry guidance) to define user's proper ISRM and resources (such as CIS-Critical Security Controls). These frameworks can be used to start implementing a basic risk management process to be further enhanced to address user's specific risks.

Implementation Guidelines:

The implementation guidelines are common methods for applying the relevant control. The guidelines can be a good way to start an assessment but should never be considered as an "audit checklist" as each user's implementation may vary. Therefore, in cases where some implementation guidelines elements are not present or partially covered, mitigations as well as particular environment specificities have to be taken into account to properly assess the overall compliance adherence level (as per the suggested guidelines or as per alternatives).

- A scenario-based risk assessment and planning activity is conducted to:
  - Identify possible methods for adversaries to gain unauthorised access to local SWIFT infrastructure based upon observed adversary techniques or plausible adversary techniques inferred from adversaries' motivations and capabilities,
  - Analyse the effectiveness of existing prevention and detection controls to mitigate anticipated adversary techniques to gain unauthorised access to the environment,
  - Analyse the probability and impact of significant and plausible attack vectors given existing controls,
  - Analyse the effectiveness of existing response controls to limit impact of significant and plausible attack vectors given existing controls,

  - Identify the need for additional preventive or detective controls.
- Assessment and planning activity is conducted at least annually, and updated via ongoing risk management activities, when significant technology changes occur, or when threat intelligence indicates relevant changes in an applicable adversary's capabilities or motivations.
- Current threat intelligence and observed/likely attacks (vectors, techniques, actors, etc.) are used as the basis for viable scenarios.
- Each asset class (end user devices, servers, network devices) is assessed against threats on a regular basis and when changes are introduced or when new threats are identified.

Appendix A: **Risk Driver Summary Matrix**

The matrix below is a summary of the risk drivers in this document, mapping the security controls to the documented risks they are intended to help mitigate.

SWIFT Security Controls / Risk Drivers	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4A	2.5A	2.6	2.7	2.8A	2.9A	2.10	2.11A	3.1	4.1	4.2	5.1	5.2	5.3A	5.4	6.1	6.2	6.3	6.4	6.5A	7.1	7.2	7.3A	7.4A
Authentication token theft																				X											
Business conducted with an unauthorised counterparty													X		X																
Compromise of enterprise authentication system	X																														
Compromise of trusted backup data									X																						
Compromise of user credentials	X																														
Credential replay	X																	X													
Deletion of logs and forensic evidence		X																													
Excess attack surface							X							X																	
Excess harm from deficient cyber readiness																												X			X
Excess privilege or access		X																	X												
Execution of malicious code																							X								
Exploitation of insecure system configuration							X							X																	
Exploitation of known security vulnerabilities						X					X												X								

SWIFT Security Controls / Risk Drivers	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4A	2.5A	2.6	2.7	2.8A	2.9A	2.10	2.11A	3.1	4.1	4.2	5.1	5.2	5.3A	5.4	6.1	6.2	6.3	6.4	6.5A	7.1	7.2	7.3A	7.4A
Exposure to internet-based attacks	X			X																											
Exposure to sub-standard security practices												X																			
Increased security risk from improperly trained staff																													X		
Lack of traceability		X														X				X						X					
Loss of operational confidentiality										X																					
Loss of operational integrity										X																					
Loss of sensitive data confidentiality					X			X	X																						
Loss of sensitive data integrity					X			X																	X						
Password cracking, guessing, or other computational compromise																	X	X													
Password theft					X					X								X				X									
Segregation of duty violations																			X												
Unauthorised access	X		X		X														X												
Unauthorised physical access																X															
Unauthorised system changes		X																						X							
Unauthenticated system traffic					X			X																							

SWIFT Security Controls / Risk Drivers	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4A	2.5A	2.6	2.7	2.8A	2.9A	2.10	2.11A	3.1	4.1	4.2	5.1	5.2	5.3A	5.4	6.1	6.2	6.3	6.4	6.5A	7.1	7.2	7.3A	7.4A
Uncontrolled proliferation of systems and data			X																												
Undetected anomalies or suspicious activity													X													X	X				
Unidentified sensitivity to cyber exposure																															X
Unknown security vulnerabilities or security misconfigurations																														X	
Untrustworthy staff or system operators																					X										

Appendix B: Secure Zone Reference Architectures

The following diagrams are for reference only, and describe one of many ways for the secure zones to be designed for each architecture (A1, A2, A3, A4, B).

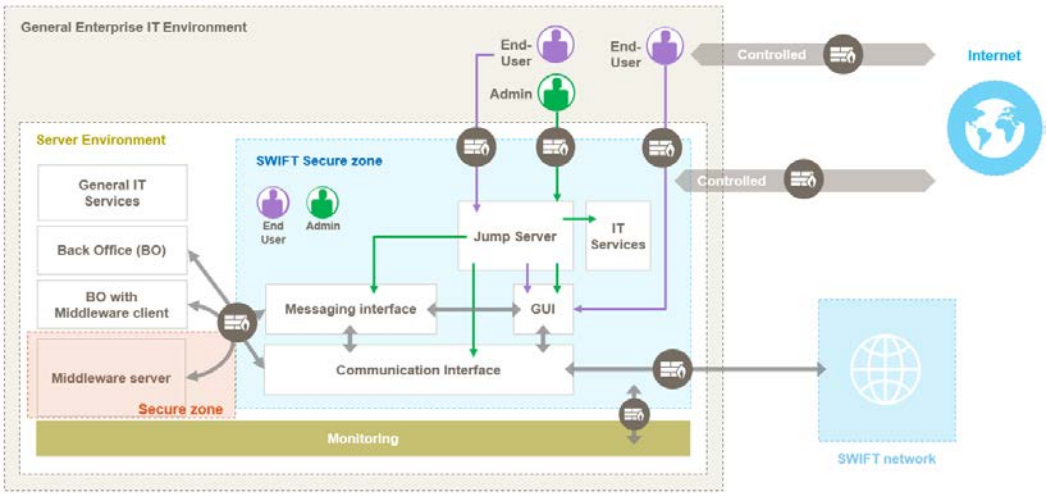


Figure 10a: Secure Zones Example for Architecture A1 - Interfaces within the user environment (on premises or in the Cloud)

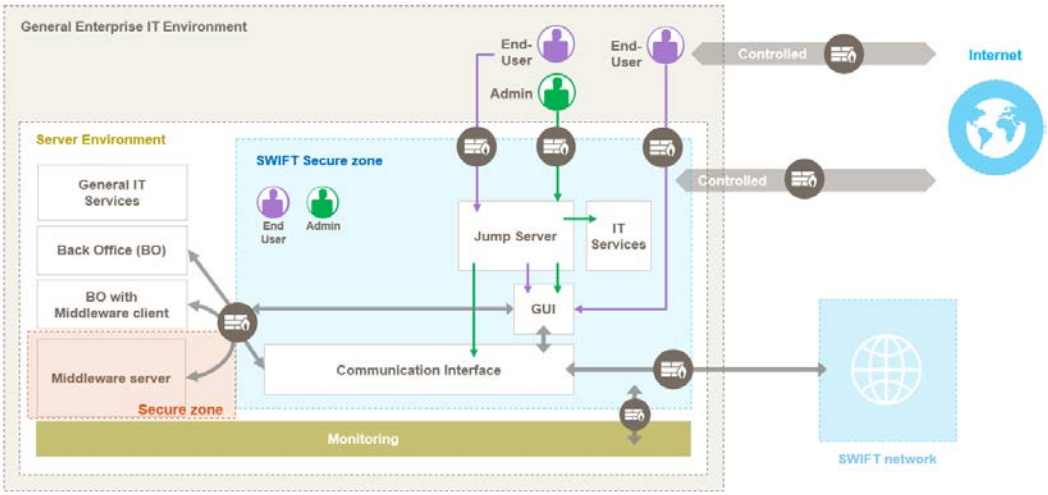


Figure 10b: Secure Zones Example for Architecture A1 - Communication interface only within the user environment (on premises or in the Cloud)

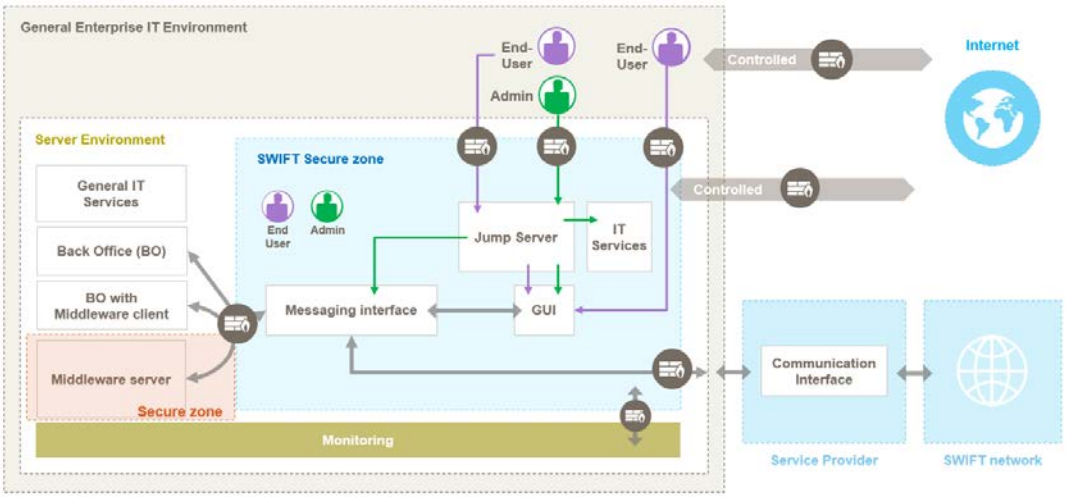


Figure 11: Secure Zone Example for Architecture A2 - Messaging interface only within the user environment (on premises or in the Cloud)

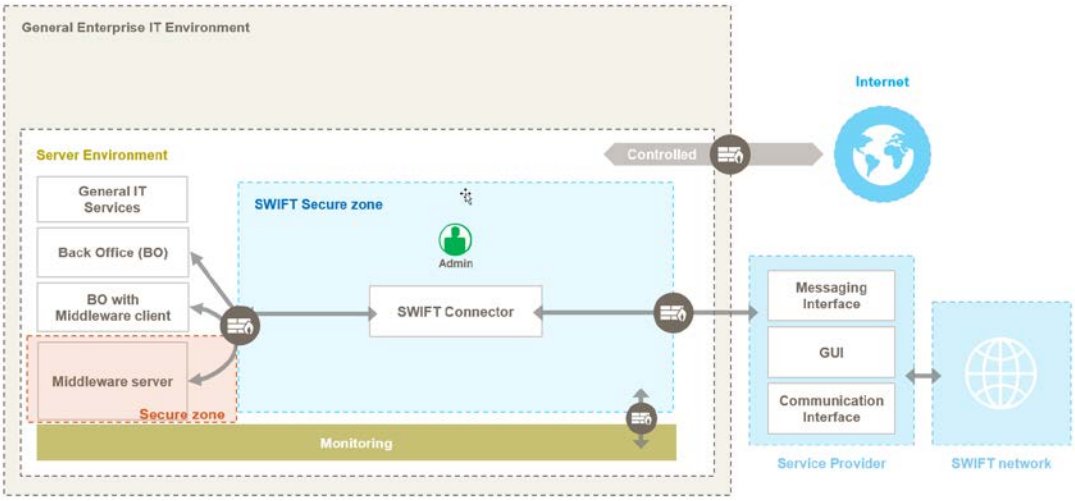


Figure 12a: Secure Zone Example for Architecture A3 – SWIFT connector

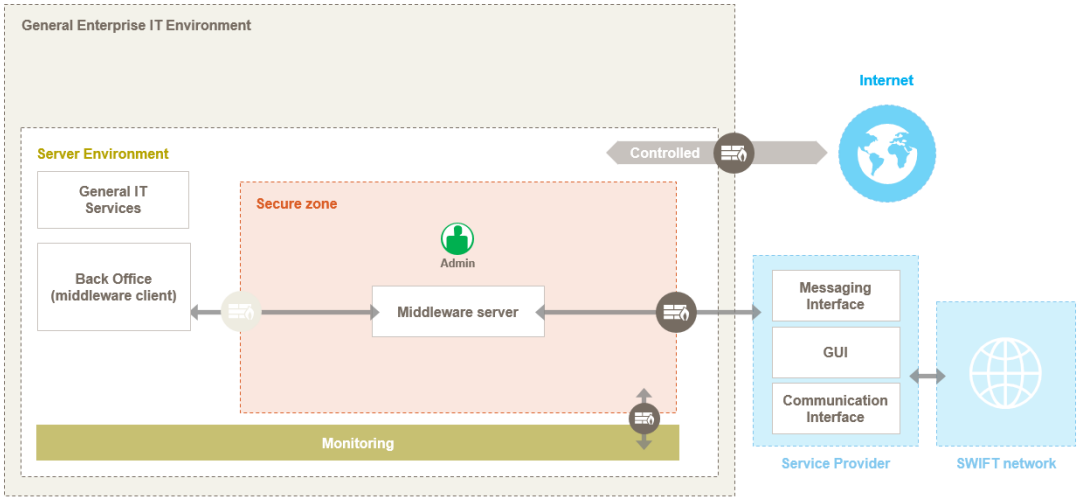


Figure 12b: Secure Zone Example for Architecture A4 – Middleware as Connector

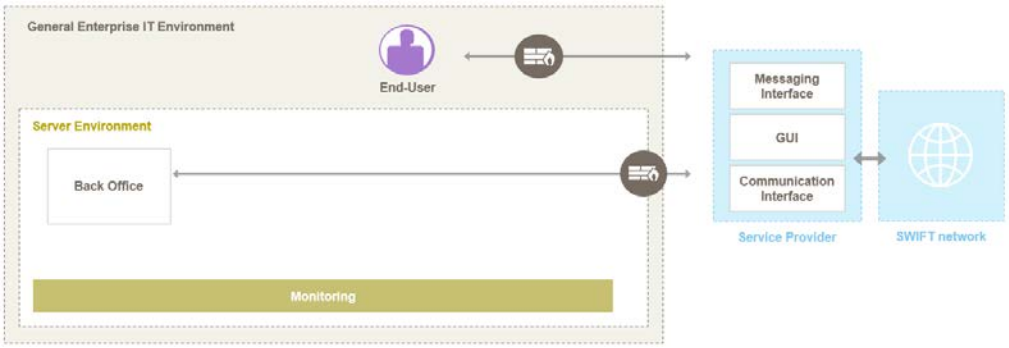


Figure 13a: Architecture B - No local footprint

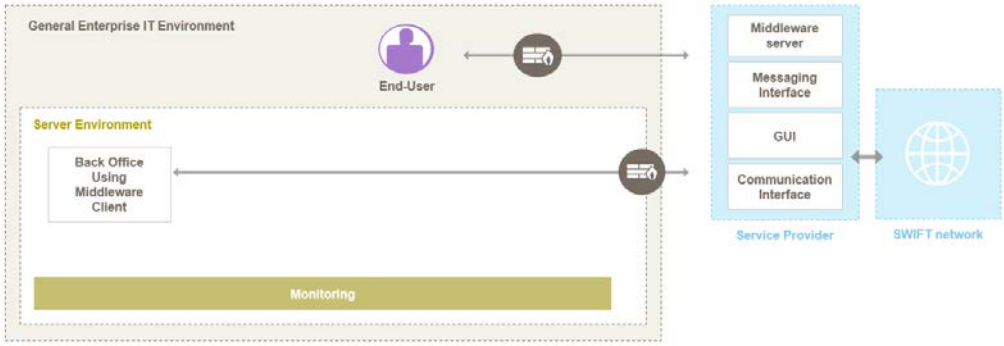


Figure 13b: Architecture B - No local footprint with middleware client

Appendix C: Sample Threat Scenarios

The following scenarios are illustrative examples to help users to understand the types of cyber threats that each security control is intended to help mitigate. These scenarios are non-exhaustive and provided for context and educational purposes only. The likelihood and impact of each scenario may differ significantly based on variables within the user environment.

1.1 SWIFT Environment Protection

- Attackers compromise credentials of the system administrator of the enterprise Active Directory, thereby granting the attackers access to all log-in credentials stored in the directory.
- Attackers compromise supporting IT infrastructure (for example, scanning server, patching server), located in the general IT environment, to steal system credentials and subsequently access the local SWIFT infrastructure.
- Attackers gain administrative access to an operator's PC, allowing the attacker to compromise the local account database and reuse the stored hashes to access other systems.
- An operator clicks on a malicious link in an e-mail, unknowingly downloading malware which compromises the local PC.

1.2 Operating System Privileged Account Control

- A system administrator using the root account in Linux performs unauthorised actions (for example, change security configurations, intentional system crash), which are not traceable to an individual operator.
- An operator with excess administrative privileges deletes logs and other forensic evidence to hide unauthorised actions.

1.3 Virtualisation Platform (also referred as the hypervisor) Protection

- An attacker with access to the hypervisor could comprise the confidentiality, integrity and availability of virtual machines hosting SWIFT services.
- An attacker with access to the hypervisor or virtual machine provisioning function could create new virtual machines to further their attack, for example by creating fake application services to lure users into divulging sensitive information or download malware.
- Vulnerabilities and/or insecure configuration in the virtualisation platform may allow attackers to breach segregation between virtual machine domains.

1.4 Restriction of Internet Access

- Attackers compromise supporting IT infrastructure (for example, middleware server or virtualisation platform server), to steal system credentials and subsequently access the local SWIFT infrastructure.
- Attackers gain administrative access to an operator's PC, allowing the attacker to compromise the local account database and reuse the stored hashes to access other systems.
- An operator clicks on a malicious link in an e-mail or web page, unknowingly downloading malware which compromises the local PC or server.

2.1 Internal Data Flow Security

- An attacker with network access to the secure zone compromises the integrity of the transactions in transit between the messaging interface and communication interface.
- An attacker with network access to the secure zone is able to monitor unencrypted traffic between local SWIFT components and record confidential transactions.

2.2 Security Updates

- An attacker uses a known and unpatched vulnerability to gain access to a server hosting a SWIFT-related application.
- The operating system has aged beyond the vendor's support lifecycle window, resulting in persistent open vulnerabilities with no available remediation from the vendor.

2.3 System Hardening

- An attacker uses the default username and password to access the administration interface of a network firewall.
- An attacker uses a vulnerability associated with an unused network protocol (for example, telnet) to gain access to a SWIFT server.

2.4A Back Office Data Flow Security

- An attacker positioned on the used middleware server or between the back office and messaging interface injects unauthenticated transactions.
- An attacker creates a man-in-the-middle attack to change the beneficiary accounts of valid SWIFT transactions.
- An attacker positioned on the used middleware server or between the back office and messaging interface is able to monitor unencrypted traffic and record confidential transactions.

2.5A External Transmission Data Protection

- A data backup location is compromised, and unencrypted SWIFT backups and credential hashes are accessed, providing the attacker with valuable information about SWIFT operators and typical activity within the local environment.
- Unencrypted backups of SWIFT servers are transmitted over an insecure network connection, resulting in an adversary gaining read-access to all recent messaging traffic records.

2.6 Operator Session Confidentiality and Integrity

- An operator leaves his desk and no timed screen lock-out is implemented, allowing an unauthorised person access to the operator's account and the SWIFT messaging interface.
- An attacker is able to perform surveillance on an unencrypted operator session, and learns from unencrypted information to plan a future attack.
- An attacker is able to perform surveillance on an unencrypted operator session, and steals credentials to create a fraudulent SWIFT transaction.
- An attacker intercepts a transaction sent between the browser and the web application, modifies its content and forwards it to the web application.
- An attacker is able to hijack an open session or bypass an authentication scheme due to unsafe settings to capture or create fraudulent SWIFT transaction.

2.7 Vulnerability Scanning

- A discoverable vulnerability is left unidentified and untreated, allowing an attacker to exploit the vulnerability to gain access to a SWIFT-related server.

2.8A Critical Activity Outsourcing

- Outsourced provider does not properly segregate SWIFT systems from other low-security systems, resulting in a virus spreading across environments and affecting the integrity of the SWIFT systems.
- Outsourced provider does not properly enforce access control, resulting in an unauthorised employee gaining access to the SWIFT messaging interface or other SWIFT related components or systems.

2.9A Transaction Business Controls

- Daily reconciliation is not performed, resulting in a fraudulent transaction going unnoticed until beyond the settlement date.
- Transactions are not limited to normal business hours, resulting in an unnoticed fraudulent transaction.

2.10 Application Hardening

- Default accounts or passwords may be used by attackers to gain unauthorised access to the application.
- Excessive privileges given to application users may be abused by attackers to perform unauthorised actions on the application.
- An attacker uses a vulnerability associated with an unused network protocol (for example, telnet) or functionality provided by unnecessary packages to gain access to a SWIFT server.

2.11A RMA Business Controls

- RMA relationships are not properly managed, resulting in the processing of a transaction from an unvetted or dormant counterparty.

3.1 Physical Security

- Poor log retention results in the inability to fully investigate which personnel had physical access to the safe after a set of SWIFT HSM tokens were discovered to be missing.
- Weak data centre access control provides unauthorised personnel with physical access to perform a physical-based attack on the SWIFT servers.

4.1 Password Policy

- A password policy is established but not enforced, resulting in operators using weak passwords that are easily cracked during a cyber attack.
- A password of insufficient length allows the computation of a weak password hash, which an attacker steals from the PC's memory and allows him to recompute the original password.
- The same passwords are used by an administrator for systems inside and outside the secure zone, resulting in an adversary compromising the more exposed password and re-using this knowledge to gain secure zone access.

4.2 Multi-factor Authentication

- Multi-factor authentication is not implemented for application access, resulting in an adversary using a stolen password to gain full access to the SWIFT messaging interface.
- Multi-factor authentication is not implemented for access to the operating system of the messaging interface, resulting in an adversary using a stolen password to gain full administrative access to the system.

5.1 Logical Access Control

- Least privilege controls are not enforced, allowing an operator who only requires read-only access the ability to create and send SWIFT transactions.
- Segregation of duty controls are not enforced, allowing a single operator to create and approve a SWIFT transaction, conflicting with the user's transaction approval policy.
- Account access is not promptly revoked, resulting in a recently transferred employee using their residual access to modify records on the SWIFT messaging interface.

5.2 Token Management

- Poor record keeping during assignment of connected hardware or personal tokens results in the inability to revoke the correct tokens after staff members leave the organisation, leading into unknown and uncontrolled residual access.
- A token is left inserted in an operator's PC when not in use, allowing an attacker to use the token as an authentication credential as part of an attack.

5.3A Personnel Vetting Process

- A new employee with a previous judicial record for financial fraud is not vetted before being granted operator access, resulting in an untrustworthy individual being placed in a position of trust.
- Current employees are not periodically vetted, resulting in the organisation not having knowledge of an employee who has taken a part-time job with another financial institution and now has a significant conflict-of-interest.

5.4 Physical and Logical Password Storage

- A SWIFT operator stores his passwords on a piece of paper at his work area, allowing any personnel with physical access to the area to view the recorded password.
- A SWIFT application administrator stores his administrative passwords in a plain-text file on his PC, thus allowing any PC system administrator access to the passwords.

6.1 Malware Protection

- Anti-malware software is not installed on the operator PC, resulting in a common malware executable compromising the PC after clicking a phishing e-mail.
- Anti-malware software on the SWIFT servers is not regularly updated, resulting in an otherwise detectable malicious executable causing harm to the servers.

6.2 Software Integrity

- An advanced attacker modifies the executable of the messaging interface and is not detected because software integrity checking has not been implemented.
- A malicious version of a software update is installed due to not verifying the checksum at time of download.

6.3 Database Integrity

- A lack of database integrity checking allows targeted malware to delete database records while performing unauthorised transactions.
- A lack of database integrity checking allows an attacker to modify database records to hide evidence.
- A lack of database integrity checking allows a gap in sequential record numbering to remain undetected.

6.4 Logging and Monitoring

- Poor system logging results in the inability to trace malicious privileged commands to a specific individual during a cyber incident investigation.
- Logs are collected but not monitored, resulting in abnormal activity going undetected until significant financial harm has occurred.

6.5A Intrusion Detection

- A lack of intrusion detection capabilities results in unusual traffic outside normal business hours going undetected.
- A lack of intrusion detection capabilities results in unexpected protocol traffic for a given port going undetected.
- The intrusion detection system is not properly configured or monitored, resulting in discoverable intrusions hiding amongst the noise of many false alarms.

7.1 Cyber Incident Response Plan

- An untested cyber incident response plan results in a poor and uncoordinated response to a serious cyber intrusion, resulting in significant and avoidable financial harm.
- The failure to notify SWIFT during a cyber incident results in incomplete sharing of information, leading to similar cyber incidents at other institutions that could have been avoided.
- The inability to act upon cyber threat intelligence leads to cyber intrusions using known methods, which could have been avoided.

7.2 Security Training and Awareness

- SWIFT operators are not trained on good security practice, resulting in staff clicking on malicious phishing email links.
- SWIFT application administrators are not trained on security awareness related to their role and thus do not detect or report suspicious activity on the SWIFT systems.
- SWIFT security officers lack knowledge related to their role and thus do not properly assign privileges for operators, allowing the bypass of the segregation of duties principle.

7.3 Penetration Testing

- Penetration testing is not conducted in the SWIFT environment, and thus excessively permissive firewall rules are not discovered and corrected.
- Penetration testing is conducted by unqualified staff who are unable to simulate a typical financial industry attacker, which results in a false sense of security and low commitment to needed security improvements.

7.4A Scenario Risk Assessment

- Realistic risk scenarios are not tested within the organisation, resulting in an incorrect estimation of likelihood, impact, and overall cyber risk.
- Risk scenarios are tested without involvement of the business units and appropriate management, resulting in poor overall value of the activity and low commitment to needed security improvements.

Appendix D: Glossary of Terms

Term	Definition
4-eyes principle	A security principle whereby two individuals must approve an action before it can be taken. This principle is also known as two-man rule or two-person integrity.
Administrator	May refer to: Application Administrators - responsible for configuring,, maintaining, and conducting privileged activities through an application interface System Administrators – responsible for configuring, maintaining, and conducting other privileged activities via operating systems or other direct (non front-end) access
Application account	Application accounts are defined as log-ons designated for an application. They are not meant to be used by a human or GUI access. Application accounts have a password that is stored, retrieved and used automatically by the application. An application account is typically used for integration purposes (for example, calling of API) or to support STP (Straight-Through-Processing).
Asset class	A category of computing asset (for example, databases, servers, applications).
Back office	The systems responsible for business logic, transaction generation, and other activities occurring before transmission into the local SWIFT infrastructure.
Connector	Connectors are local software designed to facilitate communication with a messaging or communication interface, both or to a service provider. When using a connector, interface components are usually offered by a service provider (for example, by a service bureau, hub infrastructure, or SWIFT). Alliance Lite2 AutoClient, Direct Link, MicroGateway and equivalent products are considered SWIFT connector solutions. File transfer solutions or middleware servers (such as IBM® MQ servers) are considered customer connectors. In the future, an application integrating all functionalities to directly and independently connect to the SWIFT API Gateway to process transactions will also be considered as a customer (home-made API) connector.
Customer connector	File transfer solutions or middleware servers (such as IBM® MQ servers) are considered customer connectors as opposed to SWIFT-compatible products (such as communication and messaging interfaces or connector) delivered by SWIFT or related third-party vendors. In the future, an application integrating all functionalities to directly and independently connect to the SWIFT API Gateway to process transactions will also be considered as a customer (home-made API) connector.

Term	Definition
CVSS - Common Vulnerability Scoring System	CVSS is an open industry standard for assessing the severity of software vulnerabilities by assigning severity scores to these vulnerabilities, allowing for prioritisation of responses and resources in line with the threat.
Communication interface	Communication Interface software providing a link between the SWIFTNet network and Messaging Interface software. Communication interfaces provide centralised, automated, and high-throughput integration with different in-house financial applications and service-specific interfaces. Communication Interfaces are provided by SWIFT (for example, Alliance Gateway or Alliance Gateway Instant). Communication interfaces holding a SWIFT-compatible label can also be provided by third-party vendors.
Cybersecurity incident	Any malicious act or suspicious event that compromises, or was an attempt to compromise, a computing environment.
Data exchange layer	The transporting of data between the SWIFT-related components (in the local SWIFT infrastructure or at a service provider) and a user back office first hop, at application level, as seen from the SWIFT-related components.
Dedicated operator PC	An operator PC located in the secure zone and dedicated to interact with components of the secure zone.
Endpoint Detection and Response (EDR)	Endpoint detection and response is an emerging technology that addresses the need for continuous monitoring and response to advanced threats by detecting suspicious activities and (traces of) other problems on hosts/endpoints.
Endpoint Protection Platform (EPP)	Emerging solution to address attack prevention. More frequently combines with EDR.
End User	Individuals requiring interactive access to the application (for example, for business transactions, monitoring, and access control). This includes security officers and application administrators responsible for configuring and maintaining the application.
General (enterprise) IT environment	The general IT infrastructure used to support the broad organisation. This includes general IT services and general purpose operator PCs.
General IT services	Supporting IT infrastructure, such as authentication services, asset management, databases, data storage, security services (for example, patching) and networking services (for example, DNS, NTP).
General purpose operator PCs	An operator PC located in the general enterprise environment and used for daily business activities.
Graphical user interface (GUI)	Software that produces the graphical interface for a user (that is, Alliance Web Platform and equivalent products).
Hardware token	A USB token, smart card, or similar device.
Interactive log-in / session	The session model that indicates an exchange of data (for example, when a user enters data or a command and the system returns data).

Term	Definition
Indicators of compromise (IOC)	Artefacts that can be observed on a network or operating system that might indicate system compromise.
IT services	A set of components in support of business processes inside the secure zone, such as a release and patching deployment platform, Active Directory.
Jump server	A server used to provide access to the user secure zone from the user's corporate network (for example, Citrix or Remote Desktop).
Local Authentication (LAU)	Local Authentication, abbreviated as LAU, provides integrity and authentication of files exchanged between applications. Local Authentication requires that the sending and receiving entity use the same key to compute a Local Authentication file signature.
Local SWIFT infrastructure	The collection of SWIFT-specific components within the user's production environment, including systems, applications, supporting hardware, tokens, and other authenticators. Also known as the SWIFT Secure zone.
Messaging interface	Messaging Interface software supporting the use of SWIFT messaging services (FIN, InterAct, and FileAct). The software provides the means for users to connect business applications to SWIFT messaging services and is typically connected directly to the communication interface. Messaging interfaces are provided by SWIFT (for example, Alliance Access or Alliance Messaging Hub). Messaging interfaces holding a SWIFT-compatible label can also be provided by by third-party vendors.
Middleware	Software that enables two separate programs to interact and/or to exchange data with each other (for example, IBM® MQ, BizTalk, ConnectDirect).Usually composed of a Server and Clients running on the various interconnected systems (Client-Server model). In the case of peer-to-peer model without central server, connectivity can be considered as being direct between the systems (so not through middleware).
Middleware server	Local middleware systems implementations, such as IBM® MQ server (including MQ queues manager, MQ appliance or both), used for data exchange between the SWIFT-related components (in the local SWIFT infrastructure or at a service provider) and a user back office first hop as seen from the SWIFT-related components.
Multi-factor authentication	Multi-Factor Authentication is a method of user authentication where at least two different components are required to authenticate a user. Following authentication factors can be selected: • Knowledge factor (something the user knows), for example, a PIN or a password • Possession factor (something the user has), for example, an HSM token, a Digipass, mobile phone, or an RSA One Time Password device • Human factor (something the user is), for example, finger print or any other biometric
Network access control list (ACL)	A network access control list refers to rules that are applied to port numbers or IP addresses for controlling traffic in and out. These lists are available on a network device.

Term	Definition
Network devices	Components used to assist in the management, routing, and security of the network (for example, routers, switches, firewalls).
Non-SWIFT footprint	Component deployed in user environment to link with SWIFT messaging services, SWIFT Transaction Platform, or a service provider and that is not a messaging interface, a communication interface or a connector delivered by SWIFT or a related third-party vendor. File server solutions, middleware/MQ servers or customer (home-made API) connector are such non-SWIFT footprint.
Operating system (OS) accounts	User accounts on a server or PC that are used for direct access to the operating system.
Operator	Collectively refers to both individual types below: End users – individuals requiring interactive access to the application (for example, for business transactions, monitoring, and access control). This includes security officers and application administrators responsible for configuring and maintaining the application. Operating System Administrators – responsible for configuring, maintaining, and conducting other privileged activities on the operating systems hosting the local SWIFT infrastructure.
Operator PC	The PC used by operators to conduct their duties.
PIN	Personal Identification Number - A secret number that acts like a password preventing others from gaining unauthorised access to or using a token, mobile device or card.
Privileged account	An account on an operating system or application that grants elevated access beyond that of a typical user. Includes administrator accounts on operating systems, and security officer or application owner accounts on applications.
Reasonable comfort	A level of comfort that Management can obtain from internal or external subject matter experts (SME) when: - Appropriate level of independence and objectivity of the SME is ensured; - Fair validation by the SME of control design and implementation, confirming mitigation of risks as per the control objective; and - Noted deviations do not materially impact the control's ability to mitigate the risk, or alternative controls compensate for the noted deviations. External assessments and certifications (such as against SOC or the industry standards identified in Appendix E) that cover CSCF controls, may give Management such reasonable comfort about the appropriateness of the controls as well as their operating effectiveness. Scope of and approach used for control evaluation in the context of such external assessments or certifications must be understood before relying, either in part or in full, on them.

Term	Definition
Relationship Management Application (RMA)	A filter that enables the user to limit the correspondents from which messages can be received as well as the type of messages which can be received. The use of the Relationship Management Application mechanism is mandatory for the FIN service. It is available on an optional basis for SCORE FileAct and Generic FileAct.
Remote access	Access to a computer from outside of the local network. For example, from home or from another organisation's network.
Remote log-in	Log-in to a system initiated over a network connection rather than directly from the local PC.
Secure zone	A segmented zone on user premises separated from the general enterprise. The secure zone contains SWIFT-related systems (for example, messaging interface, communication interface), and optionally other protected systems.
Server Environment	Data centre or other secured physical location hosting servers.
Service bureau	A service bureau is a SWIFT user or non-user organisation that provides services to connect SWIFT users. The services offered by a service bureau typically include sharing, hosting, or operating SWIFT connectivity components, logging in, or managing sessions or security on behalf of SWIFT users. Service bureaux are subject to the Shared Infrastructure Programme.
Service provider	An organisation that provides services to SWIFT users regarding the day-to-day operation of their SWIFT connection. The services offered typically include sharing, or operating SWIFT connectivity components, logging on, or managing sessions or security for SWIFT users. Those organisations include shared infrastructure providers (for example, service bureau, shared connectivity providers, SWIFT, group hub).
Single user or safe mode	Protected mode of operation that limits the privileges of the user.
SOAP	Simple Object Access Protocol
Software token	Authentication token in logical (software) form.
Staff	All personnel (such as employees, agents, consultants and contractors).
SWIFT connector	A connector provided by SWIFT (for example, SIL/ DirectLink, Alliance Lite2 AutoClient or MicroGateway). A connector holding a SWIFT-compatible label prrovided by a related third-party vendor.
SWIFT footprint	Messaging interface, communication interface or connectors products provided by SWIFT or holding a SWIFT-compatible label and provided by a third-party vendor.
Thick client	A software program installed and executed on the local operator PC, rather than via a browser interface.

Term	Definition
Third party	An entity independent of the SWIFT user or user's SWIFT connectivity provider. For example, an outsourced or external IT provider or cloud provider. By default, service bureau and L2BA provider are considered service provider and not third party, unless the user specifically engage with them to host and/or operate in full or part of the user's local SWIFT infrastructure (still owned by the user).
Transaction Authentication Number (TAN)	A type of single-use password generally used in conjunction with a standard ID and password. Initially presented in a list (table).
(SWIFT) Transaction Platform	Future Platform to be deployed centrally by SWIFT to offer complete transaction management as per the strategy endorsed by the Board in March 2020.
Transport Layer Security (TLS)	A cryptographic protocol that ensures confidentiality and integrity on the network and protects against replay attacks.
User	An organisation that SWIFT has admitted under the Corporate Rules as a duly authorised user of SWIFT services and products. The eligibility criteria to become a SWIFT user are set out in the Corporate Rules.
User application accounts	User accounts established at the applications layer to grant access and permissions to the application (that is, not operating system accounts).

Appendix E: Mapping to Industry Standards

The table below maps the SWIFT security controls against three international security standard frameworks:

- National Institute of Standards and Technology (NIST) is a non-regulatory federal agency within the U.S. Department of Commerce who developed a Cybersecurity Framework to help organisations to manage cybersecurity risks.
- ISO 27002 ISO/IEC 27002 is an information security standard issued by the International Organisation for Standardization (ISO) and by the International Electrotechnical Commission (IEC).
- The Payment Card Industry Data Security Standard (PCI DSS) is a proprietary information security standard for organisations who work with and are associated with payment cards.

The following mapping table provides further details on how the SWIFT security controls relate to similar controls in those industry standards. If users are certified against any of these standards and under the condition their SWIFT infrastructure is in the scope of this certification, then the table indicates how the controls from these standards relate to the SWIFT security controls.

For other standards, SWIFT suggests using the informative references provided by NIST in Appendix A: Framework Core of their Cybersecurity Framework v1.1 to navigate from the following table.

Important **Note**:

Meeting the requirements from these industry standards does not automatically imply full compliance with the SWIFT security control. Some aspects of the control might not be covered by the standard. It remains the ultimate responsibility of the user to assess whether and to which extent its compliance with one of these industry standards is suitable to assess its compliance with the SWIFT security controls.

SWIFT Control Objective	NIST Cybersecurity Framework v1.1	ISO 27002 (2013)	PCI DSS 3.2.1
1.1 SWIFT Environment Protection Ensure the protection of the user's local SWIFT infrastructure from potentially compromised elements of the general IT environment and external environment.	**Access Control (PR.AC)** **PR.AC-5:** Network integrity is protected, incorporating network segregation where appropriate	**Network security management (13.1)** **13.1.3**: Segregation in networks	**Requirement 1:** Install and maintain a firewall configuration to protect cardholder data **Applicable Subsection(s):** 1.3
1.2 Operating System Privileged Account Control Restrict and control the allocation and usage of administrator-level operating system accounts.	**Access Control (PR.AC)** **PR.AC-4:** Access permissions are managed, incorporating the principles of least privilege and separation of duties	**User access management (9.2)** **9.2.3:** Management of privileged access rights	**Requirement 8:** Identify and authenticate access to system components **Applicable Subsection(s):** 8.1, 8.5

SWIFT Control Objective	NIST Cybersecurity Framework v1.1	ISO 27002 (2013)	PCI DSS 3.2.1
1.3 Virtualisation Platform Protection Secure virtualisation platform (also referred as the hypervisor) and virtual machines (VM) as physical servers.	Access Control (PR.AC) Data Security (PR.DS) Information Protection Processes and Procedures (PR.IP) Maintenance (PR.MA) Protective Technology (PR.PT) All subcategories	9 Access Control 10 Cryptography 11 Physical and environmental security 12 Operations Security 13 Communications Security 14 Systems acquisition, development & maintenance	**Requirement 2:** Do not use vendor-supplied defaults for system passwords and other security parameters **Applicable Subsection(s):** 2.1 to 2.6
1.4 Restriction of Internet Access Restrict Internet access from operator PCs and other systems within the secure zone.	**Access Control (PR.AC)** **PR.AC-5:** Network integrity is protected, incorporating network segregation where appropriate	**Network security management (13.1)** **13.1.3**: Segregation in networks	**Requirement 1:** Install and maintain a firewall configuration to protect cardholder data **Applicable Subsection(s):** 1.3
2.1 Internal Data Flow Security Ensure the confidentiality, integrity, and authenticity of data flows between local SWIFT-related applications and their link to the operator PC.	**Data Security (PR.DS)** **PR.DS-2:** Data-in-transit is protected	**Information transfer (13.2)** **13.2.1:** Information transfer policies and procedures	**Requirement 4:** Encrypt transmission of cardholder data across open, public networks **Applicable Subsection(s):** 4.1
2.2 Security Updates Minimise the occurrence of known technical vulnerabilities within the local SWIFT infrastructure by ensuring vendor support, applying mandatory software updates, and applying timely security updates aligned to the assessed risk.	**Information Protection Processes and Procedures (PR.IP)** **PR.IP-12:** A vulnerability management plan is developed and implemented **RS.AN-5:** Processes are established to receive, analyze and respond to vulnerabilities disclosed to the organisation from internal and external sources (e.g. internal testing, security bulletins, or security researchers)	**Technical vulnerability management (12.6)** **12.6.1:** Management of technical vulnerabilities	**Requirement 6:** Develop and maintain secure systems and applications **Applicable Subsection(s):** 6.2

SWIFT Control Objective	NIST Cybersecurity Framework v1.1	ISO 27002 (2013)	PCI DSS 3.2.1
2.3 System Hardening Reduce the cyber attack surface of SWIFT-related components by performing system hardening.	**Information Protection Processes and Procedures (PR.IP)** **PR.IP-1:** A baseline configuration of information technology/industrial control systems is created and maintained	**Security requirements of information systems (14.1)** **14.1.1:** Information security requirements analysis and specification	**Requirement 2:** Do not use vendor-supplied defaults for system passwords and other security parameters **Applicable Subsection(s):** 2.2, 2.5
2.4A Back Office Data Flow Security Ensure the confidentiality, integrity, and mutual authenticity of data flows between back office (or middleware) applications and connecting SWIFT infrastructure components.	**Data Security (PR.DS)** **PR.DS-2:** Data-in-transit is protected	**Information transfer (13.2)** **13.2.1:** Information transfer policies and procedures	**Requirement 4:** Encrypt transmission of cardholder data across open, public networks **Applicable Subsection(s):** 4.1
2.5A External Transmission Data Protection Protect the confidentiality of SWIFT-related data transmitted and residing outside of the secure zone.	**Data Security (PR.DS)** **PR.DS-2:** Data-in-transit is protected	**Information transfer (13.2)** **13.2.1:** Information transfer policies and procedures	**Requirement 3:** Protect stored cardholder data **Applicable Subsection(s):** 3.4
2.6 Operator Session Confidentiality and Integrity Protect the confidentiality and integrity of interactive operator sessions connecting to the local SWIFT infrastructure.	**Data Security (PR.DS)** **PR.DS-2:** Data-in-transit is protected	**System and application access control (9.4)** **9.4.2:** Secure log-on procedures	**Requirement 8:** Identify and authenticate access to system components **Applicable Subsection(s):** 8.1
2.7 Vulnerability Scanning Identify known vulnerabilities within the local SWIFT environment by implementing a regular vulnerability scanning process.	**Continuous Monitoring (DE.CM)** **DE.CM-8:** Vulnerability scans are performed **Risk Assessment (ID.RA)** **ID.RA-1:** Asset vulnerabilities are identified and documented **RS.AN-5:** Processes are established to receive, analyze and respond to vulnerabilities disclosed to the organisation from internal and external sources (e.g. internal testing, security bulletins, or security researchers)	**Technical vulnerability management (12.6)** **12.6.1:** Management of technical vulnerabilities	**Requirement 11:** Regularly test security systems and processes **Applicable Subsection(s):** 11.2

SWIFT Control Objective	NIST Cybersecurity Framework v1.1	ISO 27002 (2013)	PCI DSS 3.2.1
2.8A Critical Activity Outsourcing Ensure protection of the local SWIFT infrastructure from risks exposed by the outsourcing of critical activities.	**Business Environment (ID.BE)** **ID.BE-5:** Resilience requirements to support delivery of critical services are established **Governance (ID.GV)** **ID.GV-2:** Information security roles & responsibilities are coordinated and aligned with internal roles and external partners **Supply Chain Risk Management (ID.SC)** ID.SC1 to ID.SC5	**Information security in supplier relationships (15.1)** **15.1.1:** Information security policy for supplier relationships	**Requirement 12:** Maintain a policy that addresses information security for all personnel **Applicable Subsection(s):** 12.8
2.9A Transaction Business Controls Restrict transaction activity within the expected bounds of normal business.	**Access Control (PR.AC)** **PR.AC-4:** Access permissions are managed, incorporating the principles of least privilege and separation of duties.	**Information transfer (13.2)** **13.2.2:** Agreements on information transfer	**Requirement 7**: Restrict access to cardholder data by business need to know **Applicable Subsection(s):** 7.1.4
2.10 Application Hardening Reduce the attack surface of SWIFT-related components by using SWIFT-compatible messaging and communication interfaces and by performing application hardening.	**Information Protection Processes and Procedures (PR.IP)** **PR.IP-1:** A baseline configuration of information technology/industrial control systems is created and maintained	**Security requirements of information systems (14.1)** **14.1.1:** Information security requirements analysis and specification	**Requirement 2:** Do not use vendor-supplied defaults for system passwords and other security parameters **Applicable Subsection(s):** 2.1 to 2.5 **Requirement 6:** Develop and maintain secure systems and applications **Applicable Subsection(s):** 6.2, 6.3, 6.4, 6.5, 6.7
2.11A RMA Business Controls Restrict transaction activity to validated and approved counterparties.	**Access Control (PR.AC)** **PR.AC-4:** Access permissions are managed, incorporating the principles of least privilege and separation of duties.	**Information transfer (13.2)** **13.2.2:** Agreements on information transfer	**Requirement 7**: Restrict access to cardholder data by business need to know **Applicable Subsection(s):** 7.1.4

SWIFT Control Objective	NIST Cybersecurity Framework v1.1	ISO 27002 (2013)	PCI DSS 3.2.1
3.1 Physical Security Prevent unauthorised physical access to sensitive equipment, hosting sites, and storage.	**Access Control (PR.AC)** **PR.AC-2:** Physical access to assets is managed and protected.	**Secure areas (11.1)** **11.1.1:** Physical security perimeter **11.1.2:** Physical entry controls **11.1.3:** Securing offices, rooms and facilities **11.1.4:** Protecting against external and environmental threats **11.1.5:** Working in secure areas	**Requirement 9:** Restrict physical access to cardholder data **Applicable Subsection(s):** 9.1, 9.3, 9.5
4.1 Password Policy Ensure passwords are sufficiently resistant against common password attacks by implementing and enforcing an effective password policy.	**Access Control (PR.AC)** **PR.AC-1:** Identities and credentials are managed for authorized devices and users	**System and application access control (9.4)** **9.4.3:** Password management system	**Requirement 2:** Do not use vendor-supplied defaults for system passwords and other security parameters **Applicable Subsection(s):** 2.1 **Requirement 8:** Identify and authenticate access to system components **Applicable Subsection(s):** 8.2
4.2 Multi-factor Authentication Prevent that a compromise of a single authentication factor allows access into SWIFT systems, by implementing multi-factor authentication.	**Access Control (PR.AC)** **PR.AC-1:** Identities and credentials are managed for authorized devices and users **PR.AC-6:** Identities are proofed and bound to credentials and asserted in interactions **PR.AC-7:** Users, devices, and other assets are authenticated (e.g., single-factor, multifactor) commensurate with the risk of the transaction (e.g., individuals' security and privacy risks and other organisational risks	**System and application access control (9.4)** **9.4.2:** Secure log-on procedures	**Requirement 8:** Identify and authenticate access to system components **Applicable Subsection(s):** 8.2, 8.3
5.1 Logical Access Control Enforce the security principles of need-to-know access, least privilege, and segregation of duties for operator accounts.	**Access Control (PR.AC)** **PR.AC-4:** Access permissions are managed, incorporating the principles of least privilege and separation of duties	**Business requirements of access control (9.1)** **9.1.1**: Access control policy	**Requirement 7:** Restrict access to cardholder data by business need to know **Applicable Subsection(s):** 7.1, 7.2

SWIFT Control Objective	NIST Cybersecurity Framework v1.1	ISO 27002 (2013)	PCI DSS 3.2.1
5.2 Token Management Ensure the proper management, tracking, and use of connected hardware authentication or personal tokens (if tokens are used).	**Access Control (PR.AC)** **PR.AC-1:** Identities and credentials are managed for authorized devices and users	**Responsibility for assets (8.1)** **8.1.2:** Ownership of assets	**Requirement 12:** Maintain a policy that addresses information security for all personnel **Applicable Subsection(s):** 12.3
5.3A Personnel Vetting Process Ensure the trustworthiness of staff operating the local SWIFT environment by performing personnel vetting.	**Information Protection Processes and Procedures (PR.IP)** **PR.IP-11:** Cybersecurity is included in human resources practices (e.g., DE provisioning, personnel screening)	**Prior to employment (7.1)** **7.1.1:** Screening	**Requirement 12:** Maintain a policy that addresses information security for all personnel **Applicable Subsection(s):** 12.7
5.4 Physical and Logical Password Storage Protect physically and logically recorded passwords.	**Access Control (PR.AC)** **PR.AC-1:** Identities and credentials are managed for authorized devices and users **Data Security (PR.DS)** **PR.DS-1:** Data-at-rest is protected	**System and application access control (9.4)** **9.4.3:** Password management system	**Requirement 8:** Identify and authenticate access to system components **Applicable Subsection(s):** 8.2.1
6.1 Malware Protection Ensure that local SWIFT infrastructure is protected against malware.	**Security Continuous Monitoring (DE.CM)** **DE.CM-4:** Malicious code is detected	**Protection from malware (12.2)** **12.2.1:** Controls against malware	**Requirement 5:** Protect all systems against malware and regularly update anti-virus software or programs **Applicable Subsection(s):** 5.1, 5.2
6.2 Software Integrity Ensure the software integrity of the SWIFT-related applications.	**Data Security (PR.DS)** **PR.DS-6:** Integrity checking mechanisms are used to verify software, firmware, and information integrity	**Control of operational software (12.5)** **12.5.1:** Installation of software on operational systems **Security in development and support processes (14.2)** **14.2.4:** Restrictions on changes to software packages	**Requirement 11:** Regularly test security systems and processes **Applicable Subsection(s):** 11.5

SWIFT Control Objective	NIST Cybersecurity Framework v1.1	ISO 27002 (2013)	PCI DSS 3.2.1
6.3 Database Integrity Ensure the integrity of the database records for the SWIFT messaging interface.	**Data Security (PR.DS)** **PR.DS-6:** Integrity checking mechanisms are used to verify software, firmware, and information integrity	**Control of operational software(12.5)** **12.5.1:** Installation of software on operational systems **Security in development and support processes (14.2)** **14.2.4:** Restrictions on changes to software packages	**Requirement 11:** Regularly test security systems and processes **Applicable Subsection(s):** 11.5
6.4 Logging and Monitoring Record security events and detect anomalous actions and operations within the local SWIFT environment.	**Protective Technology (PR.PT)** **PR.PT-1:** Audit/log records are determined, documented, implemented, and reviewed in accordance with policy **Anomalies and Events (DE.AE)** **DE.AE-2:** Detected events are analysed to understand attack targets and methods	**Logging and monitoring (12.4)** **12.4.1:** Event logging	**Requirement 10:** Track and monitor all access to network resources and cardholder data **Applicable Subsection(s):** 10.2, 10.6
6.5A Intrusion Detection Detect and prevent anomalous network activity into and within the local SWIFT environment.	**Security Continuous Monitoring (DE.CM)** **DE.CM-1:** The network is monitored to detect potential cybersecurity events	**Network security management (13.1)** **13.1.1:** Network controls	**Requirement 11:** Regularly test security systems and processes **Applicable Subsection(s):** 11.4
7.1 Cyber Incident Response Planning Ensure a consistent and effective approach for the management of cyber incidents.	**Information Protection Processes and Procedures (PR.IP)** **PR.IP-9:** Response plans (Incident Response and Business Continuity) and recovery plans (Incident Recovery and Disaster Recovery) are in place and managed	**Management of information security incidents and improvements (16.1)** **16.1.1:** Responsibilities and procedures	**Requirement 12:** Maintain a policy that addresses information security for all personnel **Applicable Subsection(s):** 12.10
7.2 Security Training and Awareness Ensure all staff are aware of and fulfil their security responsibilities by performing regular security training and awareness activities.	**Awareness and Training (PR.AT)** **PR.AT-1:** All users are informed and trained	**During employment (7.2)** **7.2.2:** Information security awareness, education and training	**Requirement 12:** Maintain a policy that addresses information security for all personnel **Applicable Subsection(s):** 12.6

SWIFT Control Objective	NIST Cybersecurity Framework v1.1	ISO 27002 (2013)	PCI DSS 3.2.1
7.3A Penetration Testing Validate the operational security configuration and identify security gaps by performing penetration testing.	**Information Protection Processes and Procedures (PR.IP)** **PR.IP-12:** A vulnerability management plan is developed and implemented **Risk Assessment (ID.RA**) **ID.RA-1:** Asset vulnerabilities are identified and documented **RS.AN-5:** Processes are established to receive, analyze and respond to vulnerabilities disclosed to the organisation from internal and external sources (e.g. internal testing, security bulletins, or security researchers)	**Information security reviews (18.2)** **18.2.3:** Technical compliance review	**Requirement 11:** Regularly test security systems and processes **Applicable Subsection(s):** 11.3
7.4A Scenario Risk Assessment Evaluate the risk and readiness of the organisation based on plausible cyber attack scenarios.	**Risk Assessment (ID.RA)** **ID.RA-1:** Asset vulnerabilities are identified and documented **ID.RA-3:** Threats, both internal and external, are identified and documented **ID.RA-4:** Potential business impacts and likelihoods are identified **ID.RA-5:** Threats, vulnerabilities, likelihoods, and impacts are used to determine risk **ID.RA-6:** Risk responses are identified and prioritized	**ISO 27001 Section 8.2**	**Requirement 12:** Maintain a policy that addresses information security for all personnel **Applicable Subsection(s):** 12.2

Appendix F: Services and Components in scope per architecture type

To help users identifying the most important elements, the table below (version 2021_1.0) presents the services and components expected to be in-scope and their usual related architecture type. It also presents for information usual elements that are not in scope

Note: this table will continuously be updated through the year and it is recommended to always use the latest version that can be found in SWIFT Knowledge Base TIP 5024040.

The following elements have to be considered when using it:

- If multiple components are owned by a user and those components have different architecture types, then the user has to attest in KYC-SA against the most comprehensive architecture type using the decision tree if needed.
- A component that is co-hosted with a component in scope is considered as in scope.
- All the components located in a secure zone have to be secured to the same level
- <CTRL F> represents the most convenient way to locate a product
- Components and listed alphabetically within each category
- <effective date> refers to the date as of which a newly introduced component should be taken into account for the CSP Assessment. If empty, it means it already has to be taken into account.
- A, B - Refers to the fact that the Architecture type can be any "A" or "B"
- N/A - Not Applicable
- SWIFT still recommends to protect components that are out of scope as if they were in scope.

In Scope/Not in CSP Scope	Category	Component Name (alphabetical within each category)	Description/Remark	Likely CSP Architecture Type(s)	Effective date
	Interfaces and Related Applications	Communication Interface (e.g. SAG, AGI)	List of compatible communication interface: https://www.swift.com/about-us/partner-programme/swift-certified-interface-programme-0?AKredir=true Also includes API connectivity functionality based on AGI or SAG	A1	
		Graphical user interface (GUI) e.g. AWP, CREST GUI, gpi GUI	SWIFT does not ensure compatibility of GUI provided by Vendors	A	
		IPLA - Alliance Access Integration Platform	Built on top of SAA	A1/A2	
		IPLA - Connector For Sanctions Screening (CFS)	CFS Connector is an IPLA component on SAA	A1/A2	
		IPLA - gpi Connector	gpi Connector on IPLA is a vertical solution running as a set of components inside of SAA-IPLA infrastructure (runs within SAA)	A1/A2	
		IPLA - Target 2 (T2) Connector	T2 connector is an IPLA component on SAA	A1/A2	
		IPLA - Target 2 for Securities (T2S) Connector	T2S connector is an IPLA component on SAA	A1/A2	
		Messaging Interface (e.g. SAA, AMH)	List of compatible messaging interface. Some Back offices might be considered as Messaging Interface (See TIP 5021823)	A1/A2	
		MQHA in relax/strict mode	Back office using the MQHA in Relax and Strict mode are considered as Messaging Interface	A1/A2	
		RAHA in relax/strict mode	Back office using the RAHA in Relax and Strict mode are considered as Messaging Interface	A1/A2	
		Relationship Management Application (RMA)	Can be stand alone or integrated in the Alliance access or AMH or vendor product - https://www.swift.com/about-us/partner-programme/swift-certified-interface-programme/document-centre	A1/A2	
		SwAP Proxy (gpi Connector) on AMH	gpi Connector on AMH is an AMH service running within AMH infrastructure (runs within AMH)	A1/A2	
		SWFA Handler - SWIFT FileAct	This component is used to transfer files and is installed in the messaging interface	A1/A2	
		SWIFT Alliance Access used to connect to ARG (Alliance Remote Gateway)	This is an SAA solution hosted on customer prem and accessing the Alliance Cloud solution at SWIFT	A2	
		SWIFTNet Link (SNL)	Can be either included in the Communication Interface or standalone	A1	
		SWIFT Translator (embedded)	when Embedded (i.e. integrated in the Messaging interface); **Out of Scope when standalone**	A1/A2	
	SWIFT Connector	Lite 2 Autoclient	This is the File base solution interfacing with SWIFT Lite servers	A3	
		SIL - Alliance Cloud	This is the SWIFT New Lite solution that replaces the Autoclient solution based on direct link	A3	
		SIL - CFS (Connector For Sanctions screening)	CFS Connector is a standalone component	A3	
		SIL - gpi Connector (aka gpi Connector Stand alone)	gpi Connector on SIL is a vertical solution running as a set of components inside of SIL which is a standalone software (e.g. Gsrp or Gcase)	A3	
		SWIFT API Connector	includes Products such as DirectLink/SIL or SWIFT Microgateway	A3	

In Scope/Not in CSP Scope	Category	Component Name (alphabetical within each category)	Description/Remark	Likely CSP Architecture Type(s)	Effective date
		SWIFT Microgateway	Provides API connectivity functionality	A3	
	Customer Connector	Customer API connector	Customer home-made API connector including API connectivity functionality, based on SWIFT API SDK/specs	A4	
		FTP solutions (servers)	File transfer solutions used to facilitate communication with SWIFT related components offered by a service provider	A4	
		[Advisory] Middleware/MQ Server	advisory in scope in 2020, Local middleware systems implementations, such as IBM® MQ server, used for data exchange between the SWIFT-related components (in the local SWIFT infrastructure or at a service provider) and the user back office	A4	
	Hardware Components	Alliance Connect VPN boxes or their virtual instances (hosting systems or machines)	Only the CSP control 3.1 (Physical security) applies	A, B	
		Connected hardware authentication or personal tokens	Connected hardware authentication or personal tokens used for SWIFT operations or secure zone access and PIN Entry Device (PED) used for HSM operations. **Includes the 3Skey personal tokens when used for SWIFT Services services (such as FIN, InterAct, FileAct in direct or through Alliance Cloud, Lite2 and in the future a messaging service or the transaction platform to be exposed by SWIFT)**	A, B	
		HSM - Hardware Security Module	Typically combined with SNL	A1	
		Network devices protecting the secure zone(s)	Includes firewalls and routers	A	
		Virtualisation Platform (Hypervisor)	Underlying layer on prem or with cloud providers hosting SWIFT Related VMs	A, B	
	Operator PCs and Operators	Dedicated Operator PC	An Operator PC located in the secure zone and dedicated to interact with components of the secure zone	A	
		General Purpose Operator PC accessing the local or remote swift infrastructure and their operators	An Operator PC located in the general enterprise environment and used for daily business activities	A, B	
		General Purpose Operator PC used to access SWIFT Messaging Services hosted and operated at a service provider	General Purpose Operator PC used to access SWIFT Messaging Services hosted and operated at a service provider (such as a service bureau, an L2BA provider, an intermediate actor, or SWIFT) and when those PCs are used to submit or affect business transactions	B	
		General Purpose Operator PC used by Alliance Cloud or Lite 2 GUI Users	GUI users only do not have a connector	B	
		General Purpose Operator PC used by L2BA GUI Users	This covers PC that remotely connect to a front end application operated by a L2BA provider	B	
		General Purpose Operator PC used by ESMIG U2A users	These are PCs connecting to the European Single Market Infrastructure Gateway (ESMIG) application over the SWIFT Network	B	
		General Purpose Operator PC connecting to Sanctions Screening cloud solution	Sanction Screening (SS) using FIN Y Copy service, The solution is used to review the blocked payments in SS and then they can be cancelled or released	A, B	

In Scope/Not in CSP Scope	Category	Component Name (alphabetical within each category)	Description/Remark	Likely CSP Architecture Type(s)	Effective date
		General Purpose Operator PC connecting to Webaccess services	Using Webplatform/SAG/SNL - over MV-SIPN	A1	
		"	Using Browser/Tokens - over MV-SIPN	B	
		"	Using Browser/Tokens - over Internet	B	
		General Purpose Operator PC accessing the gpi tracker	Using Webplatform/SAG/SNL - over MV-SIPN	A1	
		"	Using Browser/Tokens - over MV-SIPN	B	
		"	Using Browser/Tokens - over Internet	B	
	MI products footprint used for Specific SWIFT Service	CRNet in SAA	The CRNet component provides the user with a number of controls over the network connection from SWIFT Alliance to the CRNet host application. It contains the underlying processes required for file transfer and interactive services	A2	
		Euclid Client Connector (ECC) - for SWIFT traffic	delivered by SWIFT to Euclid users and used for SWIFT Traffic	A1	
		Euclid Connector Host (ECH)	delivered to Euro clear by SWIFT - only located at EuroClear premises	does not affect the architecture of the user	
		MI Channel for CLS	Market Infrastructure (MI) Channel is a messaging channel designed to enable customers to access large market infrastructures in an efficient manner. MI Channel relies on the SWIFTNet store-and-forward platform, and optimises the exchange of large amounts of data between the market infrastructure and their participants, while offering a simplified mode of operation and facilitating integration. MI Channel functionality is integrated within the existing communication Interface: SWIFTNet Link and Alliance Gateway	A1	
		MI Channel for T2S	Software that manages the full communication stack for connecting to the T2S gateway in the SWIFT OPC Specific to EuroClear	A1	
		Minimum Foot print (MFP)	This solution is offered in two flavours: (i) embedded in SNL or (ii) as standalone, replacing the SAA-SAG/SNL - in both cases, they are in scope of the CSP	A1	
		TDA - Transaction Delivery Agent	The Transaction Delivery Agent is an application, running on top of Alliance Gateway, that provides the transfer of messages between institutions. This transfer method offers once and only once guaranteed delivery of messages. The Transaction Delivery Agent interface used to communicate with the applications of the institutions is based on the standard IBM WebSphere MQ messaging middleware	A1	
	Others	Data Exchange Layer	The transport of data between the SWIFT-related components (in the local SWIFT infrastructure or at a service provider) and a user back office first hop as seen from the SWIFT-related components. Applicable controls: 2.4A, 6.4, 6.5A, 7.3A	A, B	

In Scope/Not in CSP Scope	Category	Component Name (alphabetical within each category)	Description/Remark	Likely CSP Architecture Type(s)	Effective date
		Jump Server giving access to the secure zone(s)	A server used to provide access to the user secure zone from the user's corporate network (for example, Citrix or Remote Desktop)	A	
		SOAP/API to connect from a Back Office to the Messaging Interface at a service provider	The SOAP connection method enables the exchange of MT, XML-based messages, and FileAct messages between Alliance Access and back-office applications.	B	
Not In scope		3Skey	A SWIFT personal identity solution based on PKI technology.3Skey tokens can be used with all banks to sign and approve transactions. 3SKey can be used on any electronic banking channel including in-house cash or treasury management systems, web banking, local and proprietary networks and SWIFT. You can use it to sign electronically banking instructions or connect securely to your banking application. **Note that 3Skey personal tokens used for SWIFT services are in scope (refer to Hardware Components category above)**	N/A	
		AU-NPP and GLI users	Not considered as SWIFT users	N/A	
		Back Office	The systems responsible for business logic, transaction generation, and other activities occurring before transmission into the local SWIFT infrastructure. For example, back office implementations such as SAP and General Ledger are out of scope	N/A	
		Business Intelligence (BI) Systems (e.g. SWIFT Scope)	Whilst globally out of scope, **SWIFT recommends the BI systems defined as destination for transmitted sensitive data to be considered in the control '2.5A External Transmission Data Protection'**	N/A	
		Connections to the SWIFT network supplied by SWIFT Network Partners	That includes the (i) Connection to the 4 SWIFT providers (BT Global Services, Orange Business Services, AT&T and Colt) behind the VPN Boxes and (ii) Internet connections	N/A	
		Euclid Client Connector (ECC) - Not for SWIFT traffic	Delivered by internet. SWIFT provide the connector but BT Radianz provide the network connectivity	N/A	
		Euclid PC	delivered by EuroClear to its customers	N/A	
		Euclid Server	delivered by EuroClear	N/A	
		General Enterprise IT environment	The general IT infrastructure used to support the broad organisation (for example, general purpose PCs, mail server, directory services, etc.)	N/A	
		General Purpose Operator PC accessing the gpi basic tracker	When Using SWIFT.com accounts only for Basic Tracker functionalities; i.e. not used for STOP and Recall	N/A	
		MQ Client on Back office	This is a software component that allows an application running on a system to issue calls to a queue manager (MQ Server) running on another system. The output from the call is sent back to the MQ client, which passes it to the application	N/A	
		MQHA in Basic mode	Back office using the MQHA in **Basic** mode are considered as Back office	N/A	
		RAHA in Basic mode	Back office using the RAHA in **Basic** mode are considered as Back office	N/A	
		PAG/DMC for AU-NPP	Not considered as SWIFT users	N/A	

In Scope/Not in CSP Scope	Category	Component Name (alphabetical within each category)	Description/Remark	Likely CSP Architecture Type(s)	Effective date
		Payment Control Service (PCS)	A solution used to Identify and prevent fraudulent or out-of-policy payment instructions for sent payments. **SWIFT recommends the tokens associated to this service to be covered in the control 5.2 Token Management**	N/A	
		Pre-Validation for SWIFT gpi	The gpi Pre-Validation detects payments problems before payments are sent for execution. There is consequently no specific risk in terms of CSP. The gpi Pre-Validation uses the SWIFT API Gateway. It will require to authenticate with SWIFT API platform, which can be facilitated by using dedicated technology, such as the Connector for SWIFT gpi. It can be based on SDK, SDK + gpi Standalone connector, or by using interfaces and embedded gpi connector	N/A	
		Pre-validation gpi webserver	Used for queries only and not impacting the integrity of the transactions	N/A	
		Sanctions Sreening (SS) using FIN Y Copy service - cloud solution	This solution is used to review the blocked payments in SS and then they can be cancelled or released. So, the end users don't initiate or modify payments in SS. If a payment is released it means that it has passed all transaction controls in the messaging interface (for example, 4-eyes, 6-eyes) and this is just an additional check for compliance purposes with those UN, States, PPP lists, etc. The end-users use the GUI to access the Cloud SS. **SWIFT recommends the tokens associated to this service to be covered in the control 5.2 Token Management**	N/A	
		SWIFT Scope	A business intelligence solution providing full and immediate visibility on an organisation's daily cash reporting	N/A	
		SWIFT SDK on Back Office (when relying on SWIFT footprint or customer connector)	Not in scope when relying on other SWIFT related applications/components for the connection to SWIFT Messaging/Transaction Services (using a communication interface or a SWIFT (API) Connector as SWIFT footprint)	N/A	
		SWIFT Translator (standalone)	Out of scope when standalone; **in-scope when embedded in the Messaging Interface**	N/A	
		Webaccess servers at provider side	A server hosted at a service provider and supporting a web based service	N/A	

Appendix G: Shared Responsibilities in an IaaS Cloud Model

Users engaging with third parties (such as an external IT provider or cloud provider) or service providers (such as a service bureau or a Lite2 Business Application provider) to host or operate in full or part of their own SWIFT infrastructure, have to get reasonable comfort from those third parties or service providers that the related activities are protected in line with the CSCF security controls. Indeed, the user remains responsible and accountable for their attestation they need to fill taking into account their deployed controls and those deployed by their third parties and service providers.

All outsourcing models can of course not be covered. Therefore, to illustrate and trigger users' fostering when considering their outsourcing model, the below table presents the typical sharing of responsibilities when an Infrastructure as a Service (IaaS) model in the cloud, similar to the, when available, Digital Connectivity* one, is selected.

* In Digital Connectivity, the user subscribes to a virtualised environment set up by selected cloud providers (CP) on their infrastructure. The user remains responsible for the deployment, management of the various stacks (systems and applications) in his subscription and therefore of the related controls. The HSM and the VPN can be physically hosted, or later virtualised, in the cloud provider infrastructure. If majority of the systems or components of an architecture A1 are hosted at the cloud provider, the user still has on premises some equipment, as a minimum the operator PC's, they need to protect.

Control	User	CP	Relevance for the Cloud Provider (CP)
1.1 SWIFT environment protection.	X	X	Segregated virtualised user environment [mainly through 1.1.c by design, network & operations]
1.2 OS privileged accounts control.	X	X	On the virtualisation infrastructure/environment set up by the CP
1.3 Virtualisation platform protection	X if used	X	Supporting the virtualisation infrastructure/environment set up by the CP.
1.4 Restriction of internet access.	X	X	Protection of the virtualisation infrastructure/environment set up by the CP
2.1 Internal data flow security	X		
2.2 Security updates.	X	X	On the virtualisation infrastructure/environment (and admin desktop)
2.3 System hardening	X	X	On the virtualisation infrastructure/environment (and admin desktop)
2.4A Back Office data flow security.	X	X	Secure exchange with the virtualisation infrastructure/environment and subscription of the user
2.5A External transmission data protection.	X	X	Virtualisation infrastructure/environment back-ups and transfers (between virtual stacks). Protect data storage (ideally through encryption – data at rest or environment/subscription)
2.6 Operator session confidentiality, integrity.	X	X	Limited to virtualisation infrastructure/environment and dedicated operator PCs
2.7 Vulnerability scanning	X	X	On the virtualisation infrastructure/environment
2.8A Critical activity outsourcing	X		To be considered by user depending on outsourced model (HSM) – VPN is managed by SWIFT Potential access to data to be covered in contract (if possible through virtualised environment)
2.9A Transaction business controls	X		
2.10 Application hardening	X		
2.11A RMA business controls	X		

Control	User	CP	Relevance for the Cloud Provider (CP)
3.1 Physical security	X	X	Of the virtualisation infrastructure/environment.
4.1 Password policy	X	X	On the virtualisation infrastructure/environment and the subscription set up for the user
4.2 Multi-factor authentication.	X	X	Support secure access to the virtualisation infrastructure/environment set up for the user
5.1 Logical access control	X	X	On the virtualisation infrastructure/environment and the subscription set up for the user
5.2 Token management.	X	X	Solution dependent (HSM or others used by CP to access the virtualised infrastructure)
5.3A Personnel vetting process	X	X	For operators of the virtualisation infrastructure/environment and subscription set up for the user
5.4 Physical and logical password storage	X	X	For the virtualisation infrastructure/environment, subscription and solution dependent (HSM or ?)
6.1 Malware protection.	X	X	Solution dependent on the virtualisation infrastructure/environment and operator PCs
6.2 Software integrity	X		
6.3 Database integrity	X		
6.4 Logging and monitoring	X	X	On the virtualisation infrastructure/environment and the subscription set up for the user
6.5A Intrusion detection	X	X	On the virtualisation infrastructure/environment and the subscription set up for the user (RACI)
7.1 Cyber incident response planning.	X	X	To be incorporated in customer incident response plan
7.2 Security training and awareness.	X	X	For operators of the virtualisation infrastructure/environment and subscription set up for the user
7.3A Penetration testing	X	X	On the virtualisation infrastructure/environment supporting the subscription set up for the user.
7.4A Scenario risk assessment	X	X	On the virtualisation infrastructure/environment supporting the subscription set up for the user.

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