Verification

VIS@S

Coverage

Test Plan	☑ **GENEVA**	☑ **ZURICH**
	☑ **VALID**	☐ **VC OPS**

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abstract This document is the overall Test plan for the VIS@S project which describes the global verification strategy between the different units involved (including TC, TD and Supplier).

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1 History, Review and Approval

History				
Version	Status	Date of issue	Author	Remarks
0.1	DRAFT	25/08/2015	Thomas Szemro	Creation
0.2	DRAFT	01/09/2015	Thomas Szemro	Added supplier testing framework
0.3	DRAFT	17/09/2015	Thomas Szemro	Update following 1st test follow up meeting on 16/09/2015
0.4	DRAFT	15/10/2015	Thomas Szemro	Update following 2nd test follow up meeting on 14/10/2015
0.5	PROPOSED	26/10/2015	Thomas Szemro	Added TD Test protocol reference
1	RELEASED	27/10/2015	Thomas Szemro	Ready for execution
1.01	DRAFT	29/03/2016	Thomas Szemro	Protocol update to reflect resume test (with network equipment upgrade) and project change for SAT.
1.1	DRAFT	07/04/2016	Thomas Szemro	Integrated G.Cazal review (TS)
1.2	DRAFT	07/04/2016	Thomas Szemro	Integrated O.Sarcey review (TDM-G)
1.3	DRAFT	07/04/2016	Thomas Szemro	Integrated L.Grentzinger review (TC)
1.5	PROPOSED	07/04/2016	Thomas Szemro	Proposed version
2.0	RELEASED	12/04/2016	Thomas Szemro	The first execution of this test plan covered FAT. An attempt to execute TC SAT has been done but not completed. This second release of the Test Plan covers TC+TD SAT for VALID platform without repeating FAT.

Author				
Name	Role	Signature	Signification	Date
Thomas Szemro	Test Manager		Author	12/04/2016
Review				
Name	Role	Signature	Signification	Date
Olivier Sarcey	TD representative		Content correctness	12/04/2016
Gustavo Novais	TC representative		Content correctness	12/04/2016
Xavier Ruvilly	Skyguide Project manager		Content correctness	12/04/2016
Guillem Cazal	Project QA		Formal correctness	13/04/2016

Approval				
Name	Role	Signature	Signification	Date
Jacques Barras	Change Owner		Formal correctness	14.04.16

2 Introduction

2.1 Purpose

The purpose of the Test Plan for the VIS@S project is to:

- Provide a central reference to govern the strategic approach, planning and control of the test effort. It defines the general approach that will be employed to test the deployed infrastructure.
- Provide visibility to stakeholders in the testing effort that adequate consideration has been given to various aspects governing the testing effort, and where appropriate to have those stakeholders approve the strategy and plan.

This Test Plan also supports the following specific objectives:

- Identifying the items that should be targeted by the tests
- Identifying the motivation for and ideas behind the test areas to be covered
- Outlining the testing approach that will be used
- Identifying the required resources and provides an estimate of the test efforts
- Listing the deliverable elements of the test project

2.2 Scope

- Qualification of the installation by the platform provider (hardware / FAT) using standard supplier procedure and templates.

- Network verification plan issued by TC based on the POC and pre-run execution (VALID and OPS / SAT). The TC test plan calls for Protocol which covers various aspects of the network. As an example one protocol covers the verification of the technology itself while another will demonstrate configuration has been properly performed. This testing strategy is based on the existing NELCH decision matrix.

- Verification plan issued by TDM covering operation and support (services / SAT).

- The present test plan covers the "General Requirements" from the Requirement documentation only (for VALID). Section "Capabilities and Services" will be demonstrated by contract management with a selected supplier with a Test Plan dedicated for VC OPS.

2.3 Intended Audience

The intended audience of this Test Plan includes:

- The Project Manager
- The Subject Matter experts
- The Engineer Team
- The Maintenance Team
- The Quality and Compliance team

2.4 Document Terminology and Acronyms

Term	Definition
Device under Test (DuT)	The network devices whose testing is covered by this *Test Plan*
Level of test	The level at which a test activity applies (network device level, network level local, network level extended, server, application, etc.). See Figure 1 below
Network Test Report	This report serves to document the evaluation of the test results and the impact of these results on the safety and quality of the product.
Test Catalogue	The *Test Catalogue* is an inventory of all the possible tests (evolves with time). It is part of the Decision Matrix.
Test Plan	The description of planned formal testing activities, either for a project or for changes of existing network devices. Covers also organizational aspects (resources, responsibilities and planning) and traceability.
Test Protocol	The *Test Protocol* details the actions, test methods and expected results for each kind of test. Summary of text context, needed network or network devices and test diagram ease the use of this document.
Type of test	The function of a network that the testing activity tries to verify. The types of tests are grouped into categories (xxx, yyy, etc.) identical to the networks requirements categories
FAT	Factory Acceptance Tests: tests performed by the supplier.
SAT	Site Acceptance Tests: tests performed by skyguide
VC OPS	Virtual Center Operation block as delivered by the VIS@S project

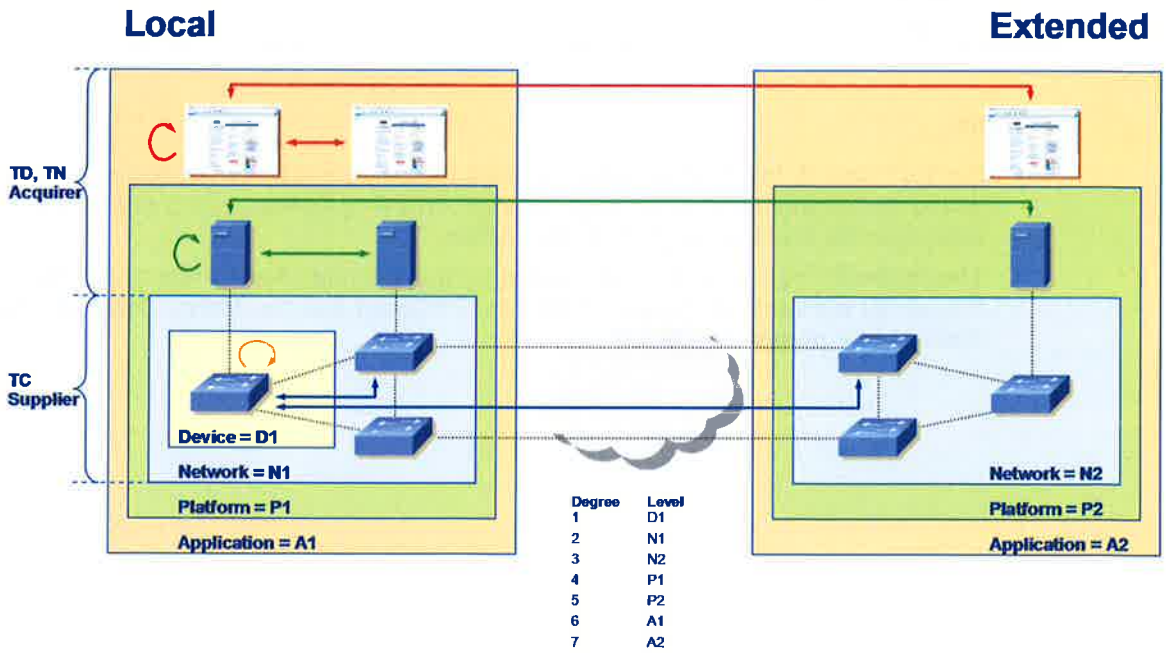

Figure 1: Test Degree/Level explanation

2.5 References and Source Documents

The table below identifies the documentation used for developing this Test Plan:

ID	Document	Existing	Used	Comments / document ID
[1]	Test Catalogue	☒ Yes ☐ No	☒ Yes ☐ No	Test catalogue has been updated for the VIS@S Project
[2]	Decision Matrix	☒ Yes ☐ No	☒ Yes ☐ No	Standard NELCH Matrix updated
[3]	Network Requirements Specification	☒ Yes ☐ No	☒ Yes ☐ No	
[4]	Network Architectural Design	☒ Yes ☐ No	☒ Yes ☐ No	Network Architecture and Detailed Configuration VIS@S 2295 N° 19544958
[5]	Network devices Documentation	☒ Yes ☐ No	☐ Yes ☒ No	
[6]	Requirement specification	☒ Yes ☐ No	☒ Yes ☐ No	VIS@S - Requirements Specification n°19697372
[7]	Document containing necessary credentials to execute the tests	☒ Yes ☐ No	☒ Yes ☐ No	VIS@S Credentials.xlsx n°27413414

Note:

- For TC Protocol, the *Decision Matrix* gives a recommendation on the minimum level of test to be guaranteed. It is the responsibility of the Project Manager to decide the adequate test level/degree that will be applied.
- **The minimum test level recommended by the *Decision Matrix* has not to be respected for each execution of the Test Protocol, but the global *Test Plan* must respect this recommendation.**

3 Test Context and Objectives

3.1 Project or Evolution Context and Background

VIS@S delivers a platform on data centers, Geneva and Dübendorf ready to host the SOA components: the Common Integration Platform and all application services.

The deployment of the test platform is managed as an isolated work package to be able to run all required tests and proof of concepts for the SOA platform selection.

For optimization purpose, the Integration, Validation and Pre-Production environments are shared on a single physical infrastructure which is validated by execution of this plan.

3.2 Test Objectives

The purposes of this activity are to:

- confirm that the specified design requirements are fulfilled by the implementation,
- provide objective evidence that the platform comply with stakeholders' requirements

3.3 Testing Approach

This section presents an overview of the techniques that are used to test the Requirements.

Functional verification: a technical test is performed and described as step by step statement to be executed. This follows defined scripts.

Non functionnal verification: the requirement is verified by other means like documentation, training, service level (ex. KPI), etc... which cannot be documented into a pre-defined script.

A requirement can be demonstrated using these two type of Tests. It is also to be noticed that requirement can be partially covered.

An example is the availability: functional test can demonstrate a technical feature (such fault tolerance) is available in the software and non-functional verification will ensure targeted number of outage and duration stays in the defined criteria when running the service during one year.

The current plan cover VALID environment and it is planned to issue a separate Plan covering VC OPS. Requirement may be partially covered in VALID but will be completed for VC OPS or justified if missing. Both kind of test and coverage are identified in the "*Traceability, coverage*" section later on in this document.

4 Target Test Items

The listing below describes the test items that have been identified as targets for testing for the phases covered by this Test Plan.

A blue boundary represents testing done by supplier (HP) while green is performed solely by skyguide.

Supplier responsibilities are to provide and execute:

- An overall test plan (dashboard) which clearly identify blocks depicted in his landscape:
  - Unit testing:
    - VM instantiation
    - ESX and related hardware function
    - SAN
  - Functional testing:
    - V-Center features
    - One View features
    - SAN features

For each of these block, a detailed tests scripts with pre-requisites, steps and acceptance criteria. Executed scripts lead to the delivery of a report.

Skyguide responsibilities are to provide and execute:

- Network test protocol and scripts
  - Basic operation of the network and its configuration
- TD protocol and script
  - Backups features
  - Demonstrate proper integration of all components in this technical landscape and proper management (fault mechanism/instantiation/monitoring….)

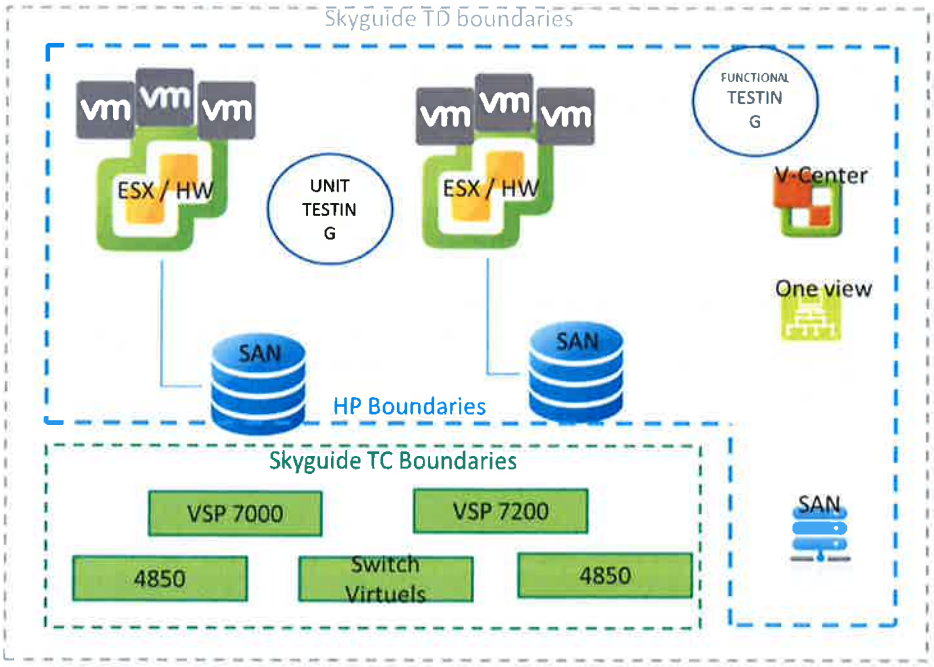

Figure 2: Scope and boundaries

Backup are not in scope of the present test plan but will be covered by VC OPS deployment and realignment of VALID platform.

Item	List, Type, Description
LAN Network Devices	
VSP 7200	Connectivity, redundancy
4850	Connectivity, redundancy
Virtual Switches	Connectivity, redundancy
WAN Network Devices	
N/A	No comments
Security Network Devices	
Firewalls	Verify the traffic
Storage Services	
SAN	High availability Maintainability
Server Services	
Hardware	High availability (Power, HDD, ...) Maintainability
ESX	High availability Load balancing Fault Tolerance
Application	
V-Center One-view	Management, Monitoring
Backup	Recovery

5 Overview of Planned Tests

The below schema represents the overall testing documentation framework as well as the link and relation between the documents. The TC and TD protocols are part of the "SAT" (Site Acceptance Test). The NELCH Test Matrix to be updated to include new steps covering equipment to be deployed. The supplier test are part of the "FAT" but in SG context, not HP manufacturing which are described into the document HP VISAS_Infrastructure_Test_Plan (also refered as Supplier Test Dashboard).

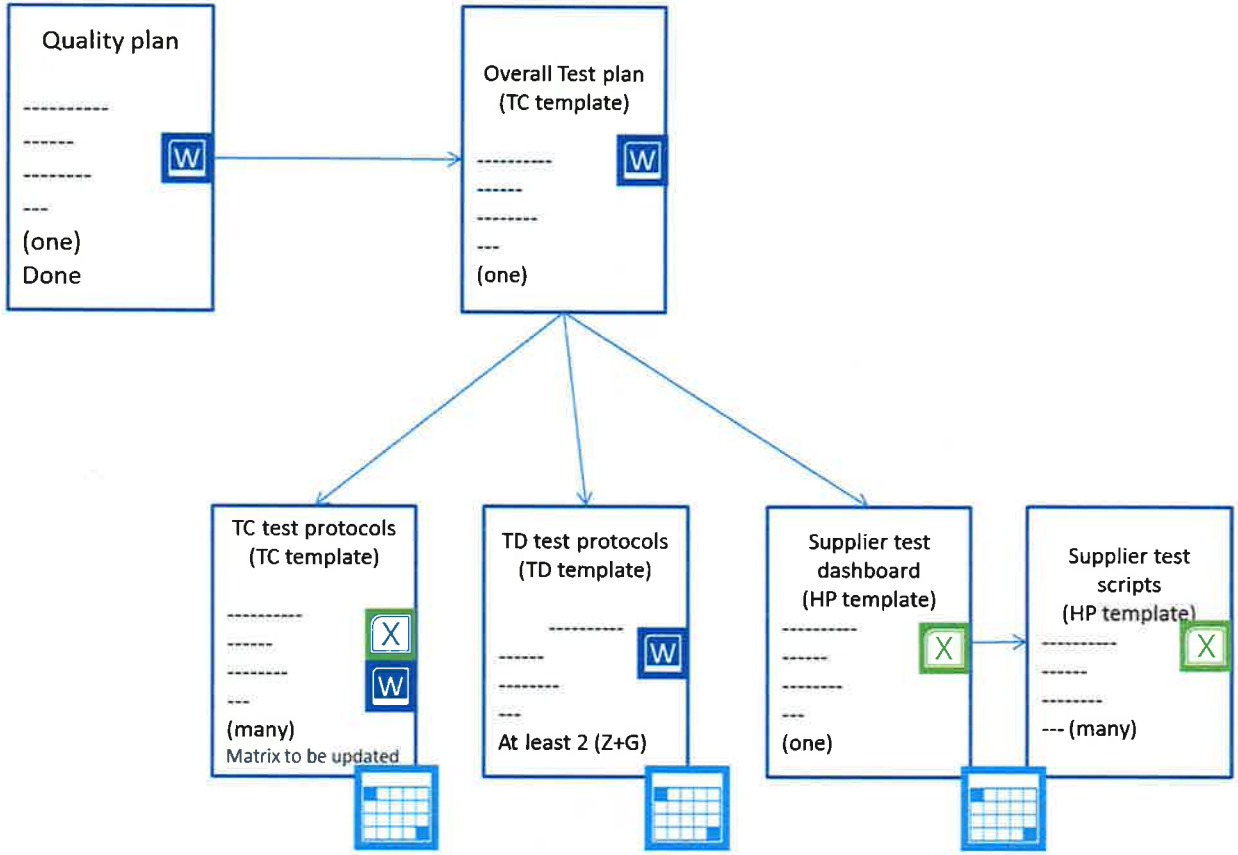

Figure 3: Testing documentation framework

5.1 Overview of Site Acceptance Tests

Deployment activities for the SAT phase corresponds to following changes identified in the TC LAN Decision Matrix,

Change Catalogue

Change ID		Change Area	Level	Description / Example	TP
L10		**Basic infrastructure**	**I**		
L40		**Node**	**D**		
L40.01		Integration and commissionning of a new access node (known model)			●
L40.02		Integration and commissionning of a new access node (unknown model)			
L40.03		Remove node		◆	
L40.04		Layer 2 node upgrade, old hardware replacement (known model)		◆	
L40.05		Layer 3 node upgrade, old hardware replacement (known model)		◆	
L40.06		Install unused node (Work preparation) - No network connection			
L40.07		Install layer 2 node (Work preparation) - Network connection, no users			●
L40.08					
L50		**Hardware Change on Node**	**D**		
L50.01		CPU / Install new card (known model)			
L50.02		CPU / Install new card (unknown model)			
L50.03		CPU / Remove card			
L50.04		I/O / Install new card (known model)			
L50.05		I/O / Install new card (unknown model)			
L50.06		I/O / Remove on card			
L50.07		Service Card / Install new card (known model)			
L50.08		Service Card / Install new card (unknown model)			
L50.09		Service Card / Remove on card			
L50.10		Power Supply / Install new module (known model)			
L50.11		Power Supply / Install new module (unknown model)			
L50.12		Power Supply / Remove module			
L50.14					
L60		**Software Configuration**	**D**		
L60.01		OS update (minor release)		◆	
L60.02		OS upgrade (major release)		◆	
L60.03					
L70	TC responsibility	**Port basic configuration**	**N**		
L70.01		Port speed / duplex (access)			●
L70.02		Port speed / duplex (trunk)			●
L70.03		Port security (802.1x, access control, etc.)			
L70.04		Access List (add, remove, change parameters)			
L70.05		Enable / disable an unused access port			
L70.06		Unused port configuration cleanup			
L70.07					
L80		**Layer 2 parameters configuration**	**N**		
L80.01		Node basic IP management parameters (add, remove, change parameters)			●
L80.02		VLAN and tagging (add, remove, change parameters)		◆	●
L80.03		Link aggregation (add, remove, change parameters)			
L80.04		IST (add, remove, change parameters)			
L80.05		MLT (add, remove, change parameters)			●
L80.06		SMLT (add, remove, change parameters)			
L80.07		Spanning Tree (add, remove, change parameters)			
L80.08		Multicast, i.e. IGMP (add, remove, change parameters)			
L80.09		QoS Layer 2 (add, remove, change parameters)			
L80.10					
L90		**Layer 3/4 local parameters configuration**	**N**		
L90.01		Routing (add, remove, change parameters)		◆	●
L90.02		Multicast routing (add, remove, change parameters)			
L90.03		VRRP (add, remove, change parameters)		◆	
L90.04		QoS Layer 3 (add, remove, change parameters)			
L90.05		Disconnection or connection of a subnet / VLAN (creation / deletion)			●
L90.06		Unused Static Route (add - work preparation, remove)			

Table 1: Link between the deployment activities and the LAN Decision Matrix

The general scope of the test activities described in this *Test Plan* for the SAT phase is presented in next sections.

5.1.1 Project Specific Tests

According to Ref. [3] documents, Project Specific tests are:

PS1	Project Specific Tests	YES	NO
PS11	**Groupe 1**		
PS11_L01	Virtual Networking Host Vis@s Configuration Verification	●	
PS11_L02	ESX Access Switching Prod/Vmotion Vis@s Configuration Validaton	●	

PS11_L03	ESX Aggregate Switching Prod/Vmotion Vis@s Configuration Validation	●	
PS11_L04	ESX Access Switching Mgmt/Deployment Vis@s Configuration Validaton	●	
PS11_L05	ESX Aggregate Switching Mgmt/Deployment Vis@s Configuration Validation	●	
PS11_L06	ESX Management Plane Connectivity	●	
PS11_L07	ESX Production Plane Connectivity	●	
PS11_L08	ESX Deployment Plane Connectivity	●	
PS11_L09	ESX Vmotion Connectivity	●	
PS11_L10	ESX Fault Tolerance Connectivity	●	
PS11_L11	QoS Congestion testing on FT/Vmotion vs Production traffic	●	
PS12	**Groupe 2**		
PS12_L01	System Redundandy - loss of VSP7k	●	
PS12_L02	System Redundancy - loss of Core uplink	●	
PS12_L03	System Redundancy - loss of ERS 4850	●	
PS12_L04			●
PS12_L05			●

Table 2: Project Specific Tests

Do note that project specific tests also include coverage of Network Level Tests and Network Device Level Tests.

5.1.2 Network Device Level Tests

According to *LANDecision Matrix*, Network Device level tests are:

D1	Network Device Level Test - Local	YES	NO	Req ID	Priority
D11	**Visual Inspection**				
D11_L01	General inspection of technical room		●		
D11_L02	Check of technical room physical access control		●		
D11_L03	Patching control (quality, labeling, etc.)		●		
D11_L04	Rack control (physical location, power supply, cabling, quality, labeling, etc.)		●		
D11_L05	Check of rack physical access control		●		
			●		
D12	**Environment and Infrastructure**				
D12_L01	Control of power supply (primary)	●			
D12_L02	Control of power supply (secondary)		●		
D12_L03	Control of power supply consistency between chain A and chain B		●		
D12_L04	Control of power supply switch over behaviour		●		
D12_L05	Control of temperature level in technical room		●		
D12_L06	Control of humidity level in technical room		●		
D12_L07	Cabling certification control (connectivity, max length, labeling, technical parameters)		●		
D13	**Device Specifc**				
D13_L01	Hardware check-up (power supply, LED, fan, modules, ports, etc.)	●			
D13_L02	Loopback tests		●		
D13_L03	Software version control and update if necessary (all cards are recognized)	●			
D13_L04	Control of ports configuration (speed, duplex mode, up / down)	●			
D13_L05	Control of local parameters (CPU load, Memory load, etc.)	●			
D13_L06	Control of hardware stability on a fixed time duration (i.e. power supply)	●			
D13_L07	Control of stability with environment (temperature, etc.)	●			
D13_L08	Control of local hardware redundancy for supervisor card		●		
D13_L09	Control of local hardware redundancy for power supply (including external PS)		●		
D13_L10	Control of local software redundancy (i.e. failover between supervisor card)		●		
D13_L11	Control of local security mechanisms (login via console port on equipment)	●			

Table 3: Network Device Level Tests

5.1.3 Network Level Tests

According to *LAN Decision Matrix*, Network Level tests are:

N1	Network Level Test - Local	YES	NO
N11	**Connectivity**		
N11_L01	Basic connectivity test with other local network equipments	●	
N11_L02	Internetwork interface status test (up, down, tagging, etc.)	●	
N11_L03	Interoperability with other equipment	●	
N11_L04	Interoperability with NMS (local and remote access for management)	●	
N11_L05	Port configuration cleanup control		●
N12	**Layer 2 Functions**		
N12_L01	VLAN tests, including tagging, and basic routing	●	
N12_L02	Link Aggregation tests (LACP, IST, MLT, SMLT, tagging, pruning)	●	
N12_L03	Spanning Tree tests (layer 2 parameters, convergence, behavior, etc.)	●	
N12_L04	Multicast tests (layer 2 parameters, behavior, etc.)		●
N12_L05	QoS tests (layer 2 parameters, behavior, etc.)	●	
N12_L06	Layer 2 redundancy (architecture, switch over, stability, etc.)	●	
N13	**Layer 3/4 Functions**		
N13_L01	Routing tests (convergence, processes status, adjacencies, routing table, etc.)	●	
N13_L02	Multicast routing tests (layer 3 parameters, convergence, behavior, etc.)		●

N1	Network Level Test - Local	YES	NO
N13_L03	QoS tests (layer 3 parameters, behavior, etc.)		●
N13_L04	Layer 3 redundancy (architecture, switch over, stability, etc.)	●	
N14	**Security**		
N14_L01	Access List tests (conformance with rules)		●
N14_L02	Access control (802.1x) tests (parameters, behaviors, etc.)		●
N15	**NMS**		
N15_L01	Integration of new node in NMS (visibility and SNMP parameters)	●	
N15_L02	Control hardware stability (hard disk, services, etc.)		●
N15_L03	NMS database consistency check (map, hostname, MIB, etc.)		●
N15_L04	Backup and restore process test		●
N15_L05	Alarming (trap, escalation, etc.)		●
N15_L06	Remote access to NMS		●
N15_L07	User access rights control		●
N16	**Capacity**		
N16_L01	Stress, load tests		●
N16_L02	Performance tests (bandwidth, delay, jitter, bit error rate, etc.)		●
N17	**Concept**		
N17_L01	Configuration validation	●	
N17_L02	Design validation		●
N17_L03	Functionalities verification and validation		●

Table 4: Network Level Tests

5.2 TC Test Exclusions Justification

This section justify divergence between the adopted test level and tests to do and the ones recommended in the ***Decision Matrix***. The ***Decision Matrix*** allows determining which tests have to be done, depending on the criticality or the importance of the change. It defines the Network Assurance Level of the tests and gives a recommendation on the minimum level of test to be guaranteed.

N/A

5.3 Tests Sequences and Dependencies

The below diagram indicate in which order protocols have to be executed from 1st to 3rd.

The test sequence is good to respect but not mandatory. Indeed the 3rd test act as the "blackbox" approach for the two other level

i.e.: if application tests are passing, it means that network is working

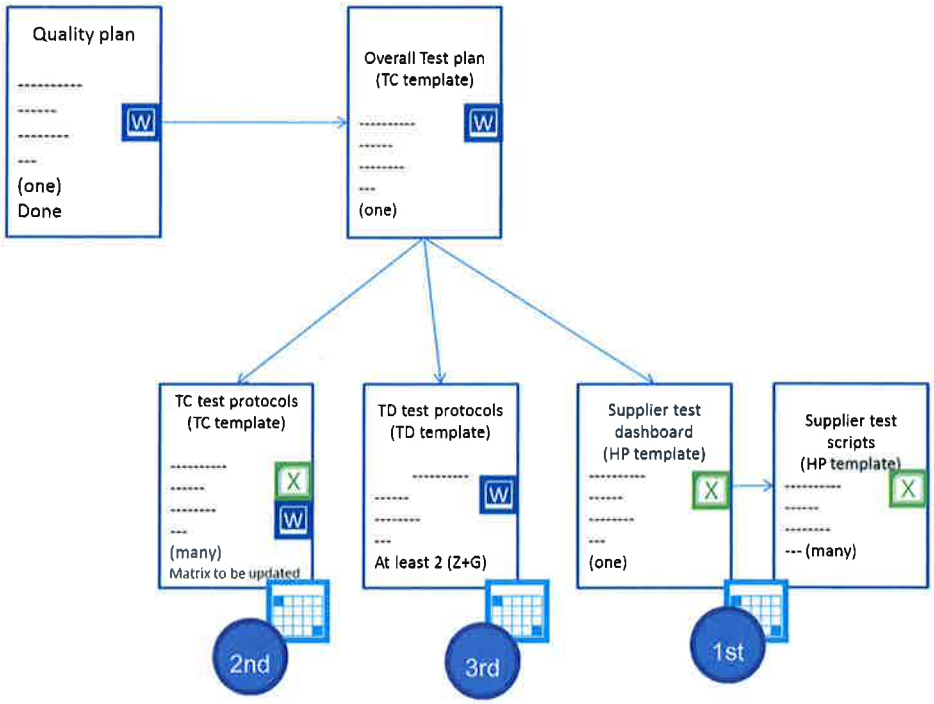

Figure 4: Test sequence and dependencies

5.4 Fail / Pass Criteria

A Test Protocol will pass when all tests inside of it are completed and have passed testing. If one or more tests inside a Test Protocols have failed testing, the feature should be flagged as unavailable and has to be further evaluated if this is blocking the complete test plan. This should trigger a new entry in the Backlog as described in section "0

Deviations".

6 Deliverables

6.1 Planned deliverables

All deliverables listed in Table 5 will be delivered at the end of the Acceptance test phase

Deliverables	**Description, Release and Handling Mode**	**Instantiation**
Test Protocols, with tests results inside	TC_Test Protocol_Vis@s GVA TC_Test Protocol_Vis@s ZRH Performed internally by skyguide Vis@s TD Test Protocol Performed internally by skyguide HP VISAS_Infrastructure_Test_Plan Performed by the supplier setting up the infrastructure	SAT Test results/Geneva SAT Test results/Zurich SAT Test results/Geneva SAT Test results/Zurich FAT Test results
Overall Test report	Consolidation of all report issued by the Test Manager	One document covering all site and both FAT and SAT

Table 5: List of Deliverables

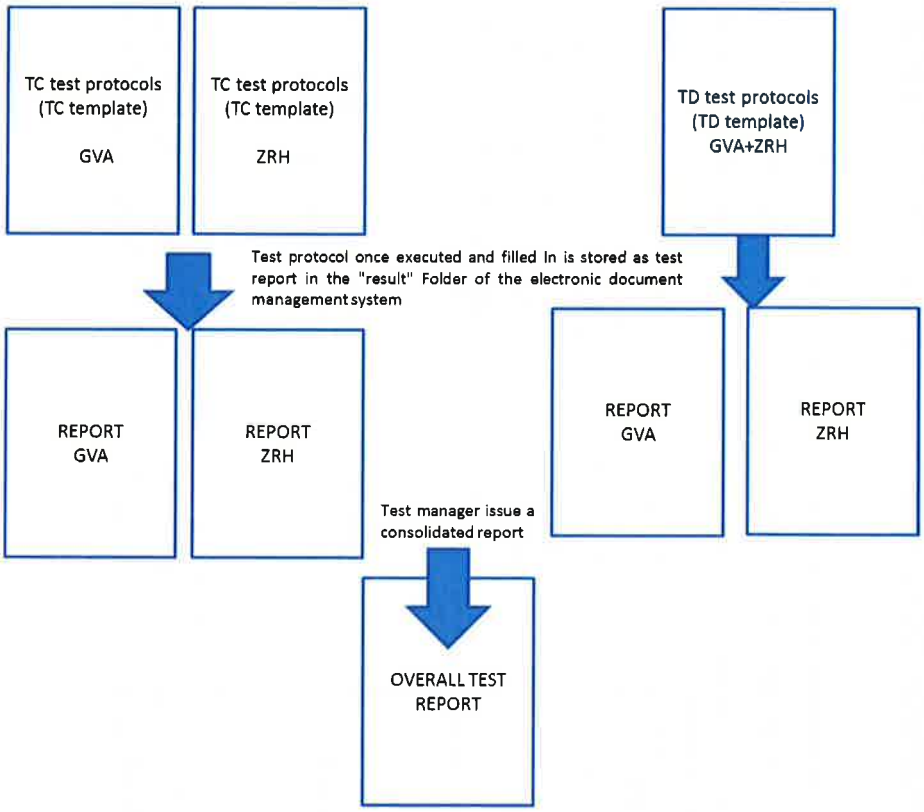

Figure 5: Visual representation of the documents

7 Traceability, coverage and configuration management

Traceability from requirement and design to testing is demonstrated in the below table.

The test has been performed under the below described document configuration.

Change modification triggered by the tests execution will be captured into the related below document which will be released at once at the end of the test cycle with version increase.

Documents	ID	Document	Version
Requirements	23330357	VIS@S - Requirements Specification	1.0
Design	20028984 19631961 19544958	VIS@S-DetailedDesign Server Architecture and Detailed Configuration Network Architecture and Detailed Configuration VIS@S 2295	0.9 0.2 0.5
TC Test protocol	22757821 23380944	TC_GVA_TestProtocol Vis@s TC_DUB_TestProtocol Vis@s	Latest version in skydoc (at the time this plan was issued, protocol writing was still in progress). Will be 1.0
TD Test protocol	23581925	Vis@s TD Test Protocol.docm	1.0
HP Test protocol	22697257	HP VISAS_Infrastructure_Test_Plan	1.4

Requirement	Design	Mapped to test	Type	Coverage	
				VALID	VC OPS
23330357 "Compliance, standards and generalities"	20028984 "Infrastructure high level view"	22757821 "Test Principle diagram" 23380944 "Test Principle diagram" 23581925 "Context" 23581925 "Test Principle diagram "	Non-functional verification	Partial	Full
23330357 "Architecture"	20028984 "Detailed design" 20028984 "Server and storage detailed design" 19631961 " Infrastructure VALID" 19631961 " Physical Architecture" 19631961 " Virtual Architecture" 19631961 "Detailed Description of the VALID Architecture" 19544958 "General Description of the Network Architecture"	22757821 "Test Principle diagram" 22757821 " PS11_L01: Virtual Networking Host Configuration Verification" 22697257 "vCcenter Features" 22697257 "ESX-HA" 22697257 "SAN-PP" 23581925 "Addressing and port information" 23581925 "Physical interface allocation per ESX"	Non-functional and functional verification	Full	Full
23330357 "Availability and Reliability"	20028984 "Authentication, Authorization and Accounting service " 19544958 "Detailed Description of the Access Architecture"	22757821 " PS11_L06: ESX Management Plane Connectivity" 23581925 "ESX high availability" 22697257 "ESX-HA"	Functional verification and functional verification	Partial	Full
23330357 "Capacity"	19631961 "Physical Architecture VALID "	22757821 "Physical interface allocation per ESX " 22757821 "Physical Switch configuration verification" 23581925 "Hardware" 23581925 "SAN" 22697257 "Rack-HA"	Non-functional and functional verification	Full	Full

Requirement	Design	Mapped to test	Type	Coverage	
				VALID	VC OPS
23330357 "Security - Connectivity"	19631961 "Firewall Communication ports" 19631961 "Detailed Description of the Security 19544958 "Detailed Description of the Security"	22757821 "PS11_L05: ESX Aggregate Switching Mgmt/deployment Configuration Validation – ERS4850" 22757821 "Control of local security mechanisms" 22757821 "PS11_L01: Virtual Networking Host Configuration Verification" 23581925 "Software" 23581925 "Addressing and port information" 23581925 "Physical interface allocation per ESX"	Functional verification	Full	Full
23330357 "Maintenance and maintainability"	20028984 "Orchestration" 20028984 "Supervision and monitoring"	22757821 "PS11_L06: ESX Management Plane Connectivity" 23581925 "SAN" 23581925 "Software" 22697257 "vCcenter Features"	Non-functional and functional verification	Partial (Orchestration out of scope)	Full
23330357 "Documentation"	20028984 "Requirement coverage"	See above mentioned document in table "7 Traceability"	Non-functional verification	Full	Full
23330357 "Infrastructure"	20028984 "Network" 19631961 "Infrastructure VALID "	22757821 "all sections" 23581925 "Platform Integration" 22697257 "all sections"	Functional Verification	Full	Full
23330357 "Performance"	19544958 "Shared Services"	23581925 "Software"	Functional Verification	Partial (Orchestration out of scope)	Partial (Orchestration out of scope)

Requirement	Design	Mapped to test	Type	Coverage	
				VALID	**VC OPS**
23330357 "Functionalities"	20028984 "Orchestration"	Orchestration out of scope : will be treated with the deployment of "Dev OPS" tools and environment	Functional verification	N/A	Could be integrated into (not yet defined) VC OPS protocols
23330357 "Management"	20028984 "Orchestration " 19631961 " Virtual Architecture Shared Management NOPS"	23581925 "Software" 22697257 "vCcenter Features" 23581925 "Software"	Non-functional and Functional verification	Partial (Orchestration out of scope)	Partial (Orchestration out of scope but could be integrated into (not yet defined) VC OPS protocols)

8 Test organisation

8.1 Resources and Responsibilities

This table shows the staffing assumptions for the test effort.

Human Resources		
Role	**Minimum Resources Recommended**	**Specific Responsibilities or Comments**
Main Roles		
Test Manager	Service & Contract Manager **Thomas Szemro**	Provide management oversight. Responsibilities include: • Define goals of testing / agree with PM • Define test strategy, resources, write the *Test Plan* • Planning of tests • Advocate the interest of tests • Report the test results to PM • Coordination with other disciplines
Test Specialist	Network subject matter expert **Gustavo Novais (ad-interim)** **Loïc Grentzinger** Application and service subject matter expert **Olivier Sarcey (GVA)** **Nietlispach Michael (ZRH)** **Philippe Perez (GVA)**	Defines implements and executes the tests. Responsibilities include: • Design the *Test Protocols* • Maintain *Test Protocols* • Implement individual tests • Set up and execute the tests • Log outcomes and verify test execution • Analyze and recover from execution errors (see backlog section 0) • Provide input to write the *Test Report* • Provide the test manager with appropriate metrics (example: number of pass/fail)
Support staff	Network subject matter expert **Gustavo Novais and TCS staff (GVA)** **Thorben Jandling and Daniel Polak (ZRH)** **August Hangartner (GVA)** * **Christophe Roux (GVA)** Safety, Compliance and QA Manager **Guillem Cazal**	Provide support and access to the testing platform or advisory * changed to JF Spring meantime -

8.2 Planning

	Geneva	Zurich	Resource	Description
Preparation and pre-requisite check	Last week of October 2015 To end of November 2015		Support staff Test specialist	VM test readiness, Test plan released, people secured, patching platform available, jump host access readiness, physical access to Geneva and Dübendorf requested
FAT execution	1st half December 2015		Test Specialists (HP)	HP Perform the test on GVA site for both sites with assistance of skyguide
FAT Reporting	After FAT execution		Test Specialists Test Manager PM	Acceptance/feedback or decision to fix and run again FAT
SAT (1st run) TC	2nd half April 2016	1week of may	Test Specialists Support staff	skyguide perform the TC and TD test
SAT (1st run) TD	2nd half April 2016			
Conciliation (SAT Acceptance / feedback)	After SAT/FAT execution Planned early may		Test Specialists Test Manager PM	skyguide to feedback on its own test to HP and agree on what should be fixed
SAT (2nd run)	End of May		Test Specialists	If applicable (verification of issue discovered during SAT 1 that has to be processed)

8.2.1 Test Start Conditions

Testing start once the infrastructure described in the design and architecture document is installed and configured by the third party under supervision of skyguide staff

8.2.2 Test End Conditions

Testing is finished once all protocols (and subsequent test scripts) identified in this test plan are executed.

8.3 Deviations

8.3.1 Definition and content

Any deviations to the specifications (implicit or explicit) , features request or improvement will be documented and tracked into a separate document called "Backlog".

This document record the following information:

- **ID**: a unique identified (incremental number)
- **Type**: should be one of the following:

bug/implemention issue	behaviour is not the expected one
change request:	the tester propose a change (script is wrong or specification was incorrect)
new feature	Improvement
deviation from specification	a documented specification is not fulfilled

- **Origin/Source**: usefull for traceability to specifiy the reference document (example; test protocol steps) or if it was raised as an implicit specifications, good practice or anything else.
- **Status at skyguide**: could be open/close/unknown
- **Status at HPE**: idem as above
- **Date raised**
- **Topic/Description**
- **Steps to reproduce**
- **Owner**: the person who is in charge to further process the issue
- **Proposed solution or workaround**
- **Comments**: provide additional free text like the severity, context or other information that will help to decide how the issue should be further treated.

Backlog file is stored in the project electronic document management system as identified in the Quality Plan.

8.3.2 Responsibility

The backlog is under the control of the Test Manager who make sure that the deviation discussed during project and test review meetings are properly tracked. The content itself is the responsibility of the person who execute the test protocol.

8.3.3 Follow up

Based on follow up and decision taken with testers and project team, some entries in the backlog may prevent the test or the project to continue. In most of the case, the issue will not be blocking provided that:

- There is a proposed workaround
- This doesn't prevent the overall platform to operate
- There is no safety risk identified
- The project and operating team are made aware about the limitations

9 Risks, Dependencies, Assumptions, and Constraints

9.1 Risks

Risk	Mitigation Strategy	Contingency (Risk is realized)
Testing activity readiness	Define a planning communicated upfront to all stakeholders. Ensure that the pre-requisites are fulfilled (like remote access) and that resources are secured	Call for a coordination meeting between skyguide Zurich/Geneva and HP
Miss-alignment of acceptance criteria with the supplier	Review and approve the test plan and protocol before execution. Release the protocol by all involved stakeholders.	Review and redefine the boundaries and the testing scope. Update plans and protocol accordingly.
Un acceptance of the platform quality by the future service provider	Propose to the service provider to participate to the FAT phase (by audit, observation, verification...) to have a "four-eye" principle and anticipate any non-conformance.	Service provider to review the design and installation of the platform

9.2 Dependencies

Dependency between	Potential Impact of Dependency	Owners
Jump host	If Jumphost is not accessible, test campaign by HP cannot start	Xavier Ruvilly
Patching environments	Patching VM platform to be available in order to execute the test scenarios	August Hangartner

9.3 Assumptions

Assumption to be proven	Impact of Assumption being incorrect	Owners
Virtual machine should be made available to perform proper testing on application level	Functional testing cannot be executed	Olivier Sarcey
Testing of the Zurich site could be done remotely from Geneva (especially FAT) with support from Zurich site when necessary	HP staff will have to go to Zurich	Xavier Ruvilly

9.4 Constraints

Constraint on	Impact Constraint has on test effort	Owners
Not constraints are identified		