JSP 602 Instruction	1019	**Applicability**	Infrastructure, Network/Communications
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JSP 602: 1019 - MOD LAN to MOD LAN

Outline

Description: This policy leaflet covers the sub-network standards (including physical and logical (Link and Network) layers) that shall be implemented by MOD LANs in order to connect to other MOD LANs. Where the purpose of the LAN to LAN connection is to connect end-systems using IP, the reader is referred to the networking standards as defined within JSP602: 1013 - Internetworking. IP services can be provided over all of the sub-networks described in this policy leaflet.

Reasons for Implementation: This interconnection policy supports MOD by (i) maximising the ability for MOD LANs to interconnect to other MOD LANs for the purposes of integrating its networks; (ii) allowing MOD systems/services to exchange data by connecting to similar sub-networks; (iii) when combined with internetworking policy provides the basis for LANs to exchange IP data with other LANs.

Issues: The choice of which sub-networks to implement is generally left to the IPT or other procuring authority, depending on the specific system requirements. However, there are some sub-network types that are mandated in order to produce a common baseline. Where a system implements a particular sub-network (below the IP layer) it must ensure that it does so to those standards mandated for that sub-network. The sub-networks described in this leaflet are packet switched.

Guidance: Connections between MOD LANs can be subject to CESG security policy. Since it may be necessary to include crypto devices within the interconnection (which may not conform to JSP602 standards), the choice of physical and logical link layers is generally best decided by the IPT based upon what cryptos are envisaged being used when connecting LANs together. Where no crypto device is required the standards have been mandated.

It is highly recommended that the guidance laid down in the GCN Architecture {ref TBA} is followed.

The e-GIF does not address policy at this level.

This policy is consistent with the NC3TA; however the NC3TA does not address the Physical connection policy

Policy

Strategic

1019.01: General Interconnection Policy

1019.01.01 Where the purpose of the LAN-to-LAN connection is to connect end-systems using IP, the only mandated sub-network technology is specified within 'Local Area Network Access' below. (Note this does not mean that IP cannot be offered over other sub-network interfaces in addition).

Comment: LAN-LAN interface policy is specified at the boundary between sub-networks which are in the same geographic location (i.e. by plugging together two physical devices). Hence this policy covers the interconnection between LAN boundary devices such as routers or other edge devices. It should be noted that where LANs are not in the same geographic location then they will be interconnected using a WAN and JSP602: 1020 – MOD LAN to MOD WAN should be followed.

1019.02: Local Area Network Access

1019.02.01 Where copper-based connections are provided the following standards are mandated on all systems and/or projects providing LAN to LAN connections:

1019.02.01.01 ISO/IEC 8802-3:2002 (IEEE Std. 802.3, 2002 Edition), Information technology, Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: CSMA/CD access method and physical layer specifications, Clauses 21-30 for 100BaseT and Clause 14 for 10BaseT.

1019.02.01.02 IEEE Std. 802.3z:1998, IEEE Std. 802.3ab:1999 - supplements to IEEE 802.3 for 1000Base-T (Gigabit) Ethernet

IEEE 802.3z defines the Gigabit Ethernet over fibre and cable, which has a physical media standard 1000Base-X (1000BaseSX - short wave covers up to 500m, and 1000BaseLX – long wave covers up to 5km). The IEEE 802.3ab defines the Gigabit Ethernet over the unshielded twisted pair wire (1000Base-T covers up to 75m). The IEEE 802.3 family of standards call-up IEEE 802.2 as a necessary pre-requisite for implementation. While security accreditation may place restrictions upon its use (e.g. TEMPEST) this standard is mandated because its widespread commercial adoption gives the greatest opportunity for connections between MOD WANs.

Comment: Commonly referred to as Fast Ethernet. This standard refers to auto-negotiation 10 baseT /100 base TX.

1019.02.02 For all LAN-LAN connections the following standards are mandated:

1019.02.02.01 IETF Standard 41/RFC 894, Standard for the Transmission of IP Datagrams Over Ethernet Networks, April 1984.

1019.02.02.02 IETF Standard 37/RFC 826, An Ethernet Address Resolution Protocol, November 1982.

1019.02.03 Where optical fibre Ethernet connections are used the following standards are mandated.

Strategic (continued)

1019.02.03.01 ISO/IEC 8802-3:2002 (IEEE Std. 802.3, 2002 Edition), Information technology, Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: CSMA/CD access method and physical layer specifications, Clauses 25 for 100BaseFX , with an MDI conforming to 26.4.1 a

1019.02.03.02 IEEE Std. 802.3z:1998, IEEE Std. 802.3ab:1999 - supplements to IEEE 802.3 for 1000Base-T (Gigabit) Ethernet

IEEE 802.3z defines the Gigabit Ethernet over fibre and cable, which has a physical media standard 1000Base-X (1000BaseSX - short wave covers up to 500m, and 1000BaseLX – long wave covers up to 5km). The IEEE 802.3ab defines the Gigabit Ethernet over the unshielded twisted pair wire (1000Base-T covers up to 75m). The IEEE 802.3 family of standards call-up IEEE 802.2 as a necessary pre-requisite for implementation.

Comment: 100Base FX with an industry standard connector. SC and ST are the most common connector types. LC type connectors are also becoming popular. Note no physical layer medium is mandated. This is to enable data rates and security requirements to be specified for projects individually.

1019.02.04 Where wireless connections are used at least one of the following standards shall be used:

1019.02.04.01 ISO/IEC 8802-11:1999, AMD1:2000(E) (IEEE Std 802.11a-1999) Part 11: Wireless LAN MAC and PHY specifications High-speed Physical Layer in the 5 GHz Band

1019.02.04.02 IEEE 802.11b-1999/Cor1-2001, (R2003) - IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements-Part 11: Wireless LAN MAC and PHY specifications- Amendment 2: Higher-speed PHY extension in the 2.4 GHz band-Corrigendum 1

1019.02.04.03 IEEE 802.11g-2003 Amendment to IEEE Std 802.11, 1999 Edition (R2003) IEEE Standard for Information technology-Telecommunications and information exchange between systems-Local and metropolitan area networks-Specific requirements-Part 11: Wireless LAN MAC and PHY specifications-Amendment 4: Further Higher-Speed Physical Layer Extension in the 2.4 GHz Band

These are the de facto standards for wireless LANs. 802.11a is a more robust protocol that is better in a noisier environment. 802.11b and 802.11g are not compatible standards, however most interface cards implement both protocols.

1019.02.05 Where Switched V-LAN connections are used, they shall only be used within a single security domain using the following mandated standards:

1019.02.05.01 IEEE 802.1Q, 2003 Edition, IEEE Standards for Local and metropolitan area networks-Virtual Bridged Local Area Networks

1019.02.05.02 IEEE 802.1p: LAN Layer 2 QoS/CoS Protocol for Traffic Prioritization

Strategic (continued)

Comment: VLANs allow the creation of multiple distinct logical networks on a single physical infrastructure. IEEE 802.1Q defines the operation of VLAN Bridges that permit the definition, operation and administration of Virtual LAN topologies within a multi-LAN infrastructure. (Bridging in this context is part of the VLAN protocol and is different to normal LAN bridging). The standard also helps provide a higher level of security between segments of internal networks. The 802.1Q specification establishes a standard method for inserting VLAN membership information into Ethernet frames. To transit from one VLAN to another requires the use of a routing device (see below). IEEE 802.1p enables Ethernet switches to prioritise traffic and perform dynamic
multicast filtering. The prioritisation specification works at the MAC framing (logical) layer.

1019.02.06 Routing services are mandated on the boundary routing device using the following standards:

1019.02.06.01 OSPFv2 (RFC 2328:1998) - mandated where connected networks exist within a common geographical area or are both nationally controlled.

1019.02.06.02 BGP-4 (RFC 1771:1995) - mandated for routing between autonomous systems. In practice this will be where long haul bearers are used to connect between geographical areas or when connecting to a network infrastructure that is not nationally controlled.

These are the de facto industry standards. OSPF is particularly appropriate for its auto-discovery and fail-over resilience. BGP gives national control over reachability and routability.

Comment: Protocols such as TCP and UDP required to support routing are covered within JSP602: 1013 - Internetworking.

1019.02.07 Where Multicast services are required within a network, the following standards are mandated on the boundary routing device:

1019.02.07.01 PIM-SM (RFC 2362:1998)

1019.02.07.02 PIM-DM (RFC 3973:2005)

PIM SM and DM standards are still formally experimental RFCs, however they are widely implemented by router manufacturers.

Deployed

1019.03: General Interconnection Policy

1019.03.01 Where the purpose of the LAN-to-LAN connection is to connect end-systems using IP, the only mandated sub-network technology is specified within Local Area Network Access below. (Note this does not mean that IP cannot be offered over other sub-network interfaces in addition).

1019.04: Local Area Network Access

1019.04.01 As defined for the Strategic domain with the following exceptions:

Deployed (continued)

1019.04.01.01 If copper-based connections are used the mandation of ISO/IEC 8802-3:2002 (IEEE Std. 802.3, 2002 Edition), for 10BaseT and 100BaseTXs is exempt from the physical form (but not electrical properties) of the connector as stated in the standard.

1019.04.01.02 If optical fibre Ethernet connections are used ISO/IEC 8802-3:2002 (IEEE Std. 802.3, 2002 Edition), for 100BaseFX , does not have to have a MDI conforming to any of those in section 26.4.1 of the standard.

Tactical

1019.05: Physical connectors

1019.05.01 Where the purpose of the LAN-to-LAN connection is to connect end-systems using IP the only mandated sub-network technology is specified within Local Area Network Access below. (Note this does not mean that IP cannot be offered over other sub-network interfaces in addition).

Comment: For the tactical domain it is important that the physical form factor of connectors are not mandated for environmental reasons. Systems should use those standards in the 'Strategic' domain if they cannot show an environmental need. So long as the electrical properties of the standard are not altered a cable with different connector types will provide interoperability.

1019.06: Local Area Network Access

As for Deployed domain.

Remote

1019.07: General Interconnection Policy

1019.07.01 The policy and standards for remote connections are dependent upon the type of connection used and are specified below for each connection type. For all connection types, interconnection across public networks (such as the internet) using VPN encryption (software or hardware) shall conform to CESG policy as defined in {policy ref}.

1019.08: Narrow band Dial-up (V.90)

1019.08.01 For interconnections using narrow band dial-up connections the mandated standards are:

1019.08.01.01 ITU-T V.90:1998 - A digital modem and analogue modem pair for use on the PSTN at data signaling rates of up to 56000 bit/s downstream and up to 33600 bit/s upstream Applicability

1019.08.01.02 ITU-T V.42:1996 - Error-correcting procedures for DCEs using asynchronous-to-synchronous conversion

1019.09: ISDN Dial-up

1019.09.01 For interconnections using ISDN dial-up connections the mandated standards are:

1019.09.01.01 Basic user-network interface - Layer 1 specification, ITU-T I.430:1995

1019.09.01.02 Primary rate User-network interface - Layer 1 specification, ITU-T I.431:1993, AMD1:1997

Remote (continued)

1019.09.01.03 ETSI Basic interface specification, ITU-T ETS 300 011:1991, A2:1996

1019.09.01.04 ETSI Primary interface specification, ITU-T ETS 300 012:1992, A2:1996

1019.09.01.05 DSS1 ISDN User interface network Data Link layer, ITU-T Q.930:1993 – formerly ITU-T I.440

1019.09.01.06 ISDN User interface network Data Link layer specification LAPD, ITU-T Q.931:1998 - formerly ITU-T I.441

1019.09.01.07 Numbering standard for ISDN era, ITU-T E.164:1997

1019.09.01.08 ISDN-PCI, ETSI ISDN API, ITU-T

1019.09.01.09 CAPI v2, CAPI CAPI v2:2001

1019.10: Broadband Dial-up (DSL)

1019.10.01 For interconnections using broadband dial-up connections the mandated standards are:

1019.10.01.01 ITU-T G.992.2 - Universal ADSL (also known as DSL Lite, splitter-less ADSL, and G.lite) provides a data rate from 1.544 Mbps to 6 Mpbs downstream and from 128 Kbps to 384 Kbps upstream. It is built upon the DMT. The suite of ADSL standards facilitates interoperability between all standard forms of ADSL.

The most widely installed form of DSL, a slower ADSL that doesn't require splitting of the line at the user end but manages to split it for the user remotely at the telephone exchange.

1019.11: Mobile Dial-up (GSM)

1019.11.01 For interconnections using mobile dial-up connections the mandated standards are:

1019.11.01.01 ETSI EN 300 961:1999 version 8.1.1, Digital cellular telecommunications system (Phase 2+) (GSM); Full rate speech transcoding

1019.11.01.02 ETSI EN 300 969:1999 version 8.0.1, Digital cellular telecommunications system (Phase 2+), Half rate speech, Half rate speech transcoding

1019.11.02 Additionally, at least one of the following are mandated:

1019.11.02.01 ETSI GSM 02.03: Circuit Teleservices supported by a Public Land Mobile Network

1019.11.02.02 ETSI GSM 02.60 and ETSI GSM 03.60: GPRS

1019.11.02.03 ETSI GSM 02.03, 04.11, 03.40: SMS MO/PP and MT/PP

Responsibility for Implementing the Policy

Implementation of this policy shall be the responsibility of all MOD projects (and their suppliers) that provide connections between MOD's Local Area Networks. This includes projects where the infrastructure may be hired and used by MOD.

Procedure

The DCSA are the owners of the MOD Wide Area network infrastructure (RLI and SLI) covering the 'Strategic' domain and extending into the 'Deployed' domain. All systems and/or projects connecting to this infrastructure shall do so in accordance with the DFTS Co Co, DCN 1997122201.

Relevant Links

JSP602: 1013 – Internetworking

JSP602: 1020 - MOD LAN to MOD WAN

The GCN Architecture can be found on the AMS web site here (not available yet) (http://www.ams.mod.uk/)

The DFTS Code of Connection, DCN 1997122201 can be found on the AMS web site (RLI only) here (not yet available) (http://www.ams.mod.uk/)

Details of those RFCs listed can be found here. (http://www.rfc-editor.org/rfcsearch.html)

ISO standards can be purchased from the ISO web site here. (http://www.iso.org/iso/en/CatalogueListPage.CatalogueList)

ETSI standards are available from the ETSI web site here. (http://www.etsi.org/home2.htm)

IEEE standards can be purchased from the IEEE web site here. (http://standards.ieee.org/)

ITU-T standards can be obtained (subscription required) from the ITU web site here. (http://www.itu.int/ITU-T/index.html)

A glossary of terms and abbreviations used within this document is available here.

Instructions on how to read a JSP602 leaflet are available here.

Compliance

Stage	Compliance Requirements
Initial Gate/DP1	MOD Projects shall submit a formal declaration that they have read and understood the policy and sought guidance from the SME(s).
Main Gate/DP2	MOD Projects shall reference in their SRD (and MODAF technical views) the specific policy elements contained within this leaflet that are applicable to the system, equipment or application they are procuring or updating.
Release Authority/DP5	MOD Projects (supported by their equipment suppliers) shall provide evidence of their compliance with the elements of this policy defined within the SRD (and MODAF technical views). Evidence of conformance with standards shall be presented; sources of evidence may include: conformance/compliance certificates provided by equipment suppliers (e.g. under type approval or other assessment regimes), demonstrations, inspection, analysis, tests carried out by suppliers (e.g. Factory Acceptance Tests) and tests carried out at Defence Test and Reference Facilities.