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NICC Document

Requirements for Ethernet Interconnect and Ethernet ALA

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Foreword

This NICC Document (ND) has been produced by NICC Ethernet Working Group.

Introduction

This document describes the requirements for Ethernet Active Line Access and for the Ethernet based Inter-connect for Ethernet services.

1 Scope

This document specifies the NICC requirements for Ethernet Interconnect and Active Line Access. These requirements cover:

1. Interconnect for, and Customer access to, residential services provided via Ethernet Active Line Access.
2. Interconnect for, and Customer access to, business services provided via Ethernet Active Line Access, where this can be done such that residential service provision does not incur undue additional complexity as a result.

Interconnect requirements for Ethernet Services not provided via Ethernet ALA are out of scope of this document.

2 References

For the particular version of a document applicable to this release see ND1610 [1].

NOTE: While any hyperlinks included in this clause were valid at the time of publication NICC cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] ND1610 Next Generation Networks, Release Definition

[2] Broadband Forum TR-101: "Migration to Ethernet-Based DSL Aggregation". April 2006. http://www.broadband-forum.org/technical/download/TR-101.pdf

[3] MEF 6.1: "Ethernet Services Definitions – Phase 2". April 2008. http://www.metroethernetforum.org/PDF_Documents/MEF6-1.pdf

2.2 Informative references

[i.1] SR 001 262 (V2.0.0): "ETSI drafting rules Section 23:- Verbal Forms For The Expression Of Provisions"

[i.2] Ofcom: "Ethernet Active Line Access: Updated Technical Requirements". 3 March 2009. http://www.ofcom.org.uk/telecoms/discussnga/eala/updated/

[i.3] NGNuk: "Definition of Requirements for NGNuk Data Interconnects". Draft 0.1, 4 October 2006. http://www.ngnuk.org.uk/

[i.4] MEF 10.1: "Ethernet Services Attributes Phase 2". November 2006. http://www.metroethernetforum.org/PDF_Documents/MEF10-1.pdf

[i.5] IEEE 802.3™-2005: "IEEE Standard for Information technology-Telecommunications and information exchange between systems-Local and metropolitan area networks--Specific requirements Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications." http://standards.ieee.org/getieee802/802.3.html

[i.6] IEEE Std 802.1Q™-2005: "IEEE Standard for Local and Metropolitan Area Networks—Virtual Bridged Local Area Networks". http://standards.ieee.org/getieee802/download/802.1Q-2005.pdf

[i.7] IEEE Std 802.1ad™-2005: "IEEE Standard for Local and Metropolitan Area Networks—Virtual Bridged Local Area Networks—Revision—Amendment 4: Provider Bridges". http://standards.ieee.org/getieee802/download/802.1ad-2005.pdf

[i.8] IEEE Std 802.1ag™-2007: "IEEE Standard for Local and Metropolitan Area Networks Virtual Bridged Local Area Networks Amendment 5: Connectivity Fault Management". http://standards.ieee.org/getieee802/download/802.1ag-2007.pdf

[i.9] IEEE Std 802.1ah™-2008: "IEEE Standard for Local and Metropolitan Area Networks-Virtual Bridged Local Area Networks Amendment 7: Provider Backbone Bridges". http://standards.ieee.org/getieee802/download/802.1ah-2008.pdf

[i.10] ITU-T Rec. Y.1731: "OAM functions and mechanisms for Ethernet based networks". http://www.itu.int/rec/T-REC-Y.1731

3 Key Words, Definitions and Abbreviations

3.1 Key Words

The key words “shall”, “shall not”, “must”, “must not”, “should”, “should not”, “may”, “need not”, “can” and “cannot” in this document are to be interpreted as defined in the ETSI Drafting Rules [i.1].

3.2 Definitions

For the purposes of the present document, the following terms and definitions apply:

ALA domain: span of control of the ALA-provider

ALA-provider: Operator of the access network segment over which an Ethernet ALA product is offered

ALA-user: Direct user of Ethernet ALA, i.e. another type of service provider, not the end-user.

ALA-user connection: connection between the UNI(s) and NNI supported by Ethernet ALA for each ALA-user

Customer Premises Equipment: equipment provided and operated by the ALA-user or end-user
NOTE: The terms ‘ALA-user CPE’ and ‘end-user CPE’ are used within the text where it is necessary to distinguish between the two.

End-user: Ultimate recipient of services provided over ALA
NOTE: End-users include both residential consumers and business users.

Ethernet ALA: Ethernet service between the serving exchange and the customer premises provided by the ALA-provider to the ALA-user
NOTE: The term Ethernet ALA is overloaded since it is used both in the Ofcom Technical Requirements and by this document. Within this document, the term Ethernet ALA (or just ALA) is used to describe the service that will be defined by the NICC Ethernet Working Group, largely based on the Ofcom Technical requirements.

Network Termination Unit: device provided and operated by the ALA provider at the customer premises that terminates the network of the ALA provider and provides the UNI

User-Network Interface: interface between the ALA-provider and the ALA-user at the customer premises

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ALA	Active Line Access (Ofcom)
CBS	Committed Burst Size
CIR	Committed Information Rate
CoS	Class of Service
CPE	Customer Premises Equipment
EBS	Excess Burst Size
EIR	Excess Information Rate
EVC	Ethernet Virtual Connection
IGMP	Internet Group Management Protocol
IPTV	Internet Protocol Television
NNI	Network-Network Interface
NTU	Network Termination Unit
OSI	Open Systems Interconnection
QoS	Quality of Service
UNI	User-Network Interface
VLAN	Virtual Local Area Network

4 Overview

This document specifies requirements for Ethernet ALA based on initial requirements for this service provided by Ofcom [i.2] and by NGNuk [i.3]. The Ofcom requirements were the result of extensive consultation with industry stakeholders. The aim of this document is to define a service that meets both sets of requirements to the extent that is both possible and sensible; not all of the input requirements have been adopted. Further, the working group found it necessary to add some requirements in order to meet the spirit of some the input requirements, and/or as a result of detailed debate within the group. Future work may include the definition of profiles to meet the needs of different classes of end-user.

In order to trace the origin of the various requirements, they have been tagged as follows:

- Requirements from Ofcom Ethernet Active Line Access: Technical Requirements [i.2] are tagged as (ALA-<Req-Num>).
- Requirements from Definition of Requirements for NGNuk Data Interconnects [i.3] are tagged as (NGN-<Req-Num>).
- Requirements added by the Ethernet Working Group are tagged as (ETH-WG).

Ofcom and NGNuk requirements that have not been adopted into this document are listed in Annex A, along with the reason for their non-inclusion.

The NGNuk document [i.3] uses the term 'Interconnect' to refer to the combined entity of the Ethernet ALA service and its associated UNI / NNI. Requirements within this document have replaced the term interconnect with either 'Ethernet ALA', 'UNI' or 'NNI' as appropriate.

The business entities that are involved with Ethernet ALA are as follows:

- The **ALA-provider** is responsible for the provision of active and passive infrastructure over which ALA is delivered. The ALA-provider offers standardised interfaces to which ALA-user can connect, and transports the ALA-users traffic between these interfaces, across the ALA domain. The ALA domain extends from the end-user premises to an interconnect point further up the network. ALA-providers may include both fixed and wireless infrastructure providers. They may own or lease the passive and active parts of network, e.g. an ALA-provider may own the active electronics, but lease the passive infrastructure.
- The **ALA-user** purchases access from the ALA-provider, over which it delivers services such as voice, video and internet connectivity. The ALA-user has a direct, contractual relationship with the ALA-provider. The ALA-user may also have a direct relationship with the end-user or with other communications providers on a wholesale basis. ALA-users may include internet service providers and triple-play operators, but not over-the-top service-providers such as web-based video services.
- The **End-user** is the ultimate recipient of services provided over ALA. End-users include both residential consumers, and business users.

5 General Requirements

This section contains requirements detailing the fundamental principles of ALA.

[R5-10] (ALA-P.1) Ethernet ALA shall be independent of the underlying infrastructure to the extent that is technically possible.

[R5-20] (ALA-P.2) ALA interfaces shall be provided at the lowest practical and economical OSI layer for the end-to-end service. ALA interfaces shall be Ethernet-based, but some higher layer functionality may also be required (e.g. IGMP).

[R5-30] (ALA-P.3) Ethernet ALA should minimise cost and complexity for ALA-providers and ALA-users wherever possible.

[R5-40] (ALA-P.4) ALA functionality should be focused on the needs of residential services. ALA functionality should not prevent ALA-providers from adding additional functionality to support business services.

6 Ethernet ALA Service Requirements

This section contains requirements for the Ethernet ALA service.

6.1 VLAN Architectures

TR-101 [2] defines 1:1 and N:1 VLAN architectures.

[R6-1-10] (ETH-WG) The ALA User's network and the ALA Provider's network may each support a 1:1 VLAN architecture or N:1 VLAN architecture or both. The use of either VLAN architecture does not preclude the use of a point-to-multipoint VLAN architecture for Ethernet Multicast as required in section 6.2.

NOTE: The technical feasibility of either supporting both 1:1 and N:1 VLAN architectures or interworking between the two is under study.

MEF 6.1 [3] defines three types of Ethernet service:

- E-Line (point-to-point connection)
- E-LAN (multipoint-to-multipoint)
- E-Tree (rooted multipoint)

[R6-1-20] (ETH-WG) Ethernet ALA shall support E-Line services.

6.2 Multicast

Multicast enables ALA-users to distribute content via a one-to-many architecture, therefore reducing the bandwidth required in the backhaul.

[R6-2-10] (ALA-M.1) ALA shall include functionality to recognise and act upon multicast packets. This shall not preclude an ALA-user from implementing a separate multicast solution beyond the ALA domain.

[R6-2-20] (ALA-M.1) ALA-providers shall provide multicast functionality at network locations where there is commercial demand from ALA-users.

[R6-2-30] (ALA-M.2) A multicast group membership protocol is essential to manage multicast services, and shall be done using recognised standards. Snooping of this protocol shall be supported at all replication points in the distribution network where appropriate bandwidth savings can be made.

[R6-2-40] (ALA-M.3) The ALA multicast interface shall be independent of the infrastructure over which packets are delivered.

[R6-2-50] (ALA-M.4) The ALA multicast solution shall support multiple independent ALA-users.

[R6-2-60] (ALA-M.5) ALA shall support a mechanism to provide always-on multicast groups in the ALA provider's architecture i.e. groups which are always transported to a replication point even if there are no end-users consuming those groups at a particular time.

6.3 Frame Transparency

ALA is a frame based service. This section describes the disposition of different types of control frames.

[R6-3-10] (NGN-6) Ethernet ALA shall treat the IEEE802 standardised frame and protocol types as defined in Table 1.

Protocol/Function	Ethernet ALA Behaviour
nBmB Line Code	Terminated
Inter-Frame Gap	Terminated
Preamble	Terminated
Start of frame delimiter	Terminated
Frame check sequence	Processed and errored frames discarded
Auto Negotiation	Terminated
Pause Frames	Terminated
Other IEEE802.3 Control Frames	Terminated (NICC to define a table of what is passed or terminated by service)
IEEE802.1 Control Frames	Passed transparently (NICC to define a table of what is passed or terminated by service)

Table 1 – Ethernet Transparency options

[R6-3-20] (ETH-WG) Ethernet ALA shall be able to transport end-user C-VLAN and S-VLAN tags [i.7].

[R6-3-30] (ETH-WG) Service frame sizes of up to at least 1600 bytes measured from the start of the destination address field to the end of the data field (excluding frame check sum) shall be supported.

[R6-3-40] (ETH-WG) Ethernet ALA shall support a configured mode where ALA-User frames (including VLAN tags) are not modified by the service.

[R6-3-50] (ETH-WG) Ethernet ALA shall support the transport of the control protocols and management channels to allow management of ALA-user CPE.

6.4 Traffic Management

Ethernet ALA will provide different levels of Quality of Service, to allow the delivery of time sensitive services such as voice telephony, video telephony, and streaming video services such as IPTV.

6.4.1 Capacity Allocation

[R6-4-10] (ALA-Q.1) The ALA-provider shall support a specified assured, policed, capacity. ALA capacity parameters shall include, as a minimum, a Committed Information Rate (CIR).

Note: The term 'assured capacity' is used in the context of traffic management and its use does not imply any contracted level of service availability.

[R6-4-20] (ALA-Q.2) ALA capacity parameters may also include an Enhanced Information Rate (EIR). The ALA-provider shall prevent any one ALA-user from unduly affecting another.

[R6-4-30] (ALA-Q.1) Ethernet ALA shall be able to provide sufficient minimum committed bandwidth (and support the appropriate traffic priority) for emergency voice communications.

[R6-4-40] (ALA-Q.4) ALA-providers shall be able to specify the available ALA capacity at the UNI in both the upstream and downstream directions.

Note: The specification of 'available ALA capacity' is left for further study.

[R6-4-50] (ALA-Q.9) Where the per end-user physical layer capacity varies in real-time, the ALA-provider shall make available reliable and timely information to the ALA-user on the capacity available to them.

6.4.2 Classes of Service

Ethernet can provide up to 8 classes of service. Network operators must be able to define which classes of service they support; these are likely to differ between operators. Interworking between classes will need to be agreed between the interconnecting operators including any translation between classes.

[R6-4-60] (ALA-Q.7) ALA shall support multiple different classes of service.

[R6-4-70] (ALA-Q.5) Ethernet ALA shall support a defined set of priority markings, standardised across ALA-providers, which determines how traffic is treated in terms of forwarding and drop precedence. This will allow ALA-users to manage the assignment of priority bits to their packets.

[R6-4-80] (ALA-Q.5) Traffic having the same priority and the same bandwidth service level agreement from different ALA-users shall be treated in the same way by the ALA provider.

6.4.3 Policing and Shaping

[R6-4-90] (ALA-Q.10) Capacity contracts must be able to include the CIR, CBS, EIR, EBS at the NNI and the UNI. In the case of the NNI this shall be the aggregate-capacity, and at the UNI the end-user capacity.

[R6-4-100] (ALA-Q.11) The ALA-provider shall police traffic in order to meet its CIR:EIR contracts with individual ALA-users.

[R6-4-110] (ALA-Q.12) The ALA service definition shall be able to include attributes for latency, jitter, network availability, and packet loss.

Note: It is recognised that these parameters can be affected by the activities of all ALA-users on a network (and possibly by more than one infrastructure provider) and defining minimum requirements or expected ranges may be difficult. The ALA-provider can leave these performance service attributes unspecified.

[R6-4-120] (ETH-WG) ALA-users shall be able to mark traffic with Ethernet CoS markings as appropriate for each service they offer to the end-user. This will allow services to be delivered without the end-user requiring an understanding of service priorities.

[R6-4-130] (ALA-C.2) QoS shall be controlled on a per end-user basis at the UNI, but may be controlled on an aggregate basis at the NNI.

6.4.4 Existing QoS standards

[R6-4-140] (ALA-Q.16) Ethernet ALA shall, wherever possible, use existing standards to provide its overall QoS scheme.

6.5 Fault Management

[R6-5-10] (NGN-6.4) The UNI and NNI shall support Ethernet Continuity Check [i.10].

[R6-5-20] (NGN-6.4) The UNI and NNI shall support Ethernet Loopback [i.10].

[R6-5-30] (ALA-5.16.1) The ALA-user shall be able determine the bidirectional state of connectivity between the NNI and the UNI.

[R6-5-40] (NGN-6.4) The ALA provider equipment supporting the UNI and NNI shall support generation of Ethernet Alarm Indication Signal (AIS) [i.10] frames at the Maintenance Domain Level of the ALA-user.

[R6-5-50] (NGN-6.4) The UNI and NNI shall support the Remote Defect Indication mechanism as identified in IEEE802.1ag [i.8].

[R6-5-60] (ALA-5.14) The ALA provider should offer ALA users a management interface allowing the ALA user to run diagnostics that isolate any network faults in the ALA provider domain.

[R6-5-70] (ALA-5.16.4) ALA-users should be able to request loopback of all service frames on the ALA NTU.

[R6-5-80] (ETH-WG) The ALA NTU shall provide visual indication of power.

6.6 Performance Management

[R6-6-10] (NGN-6.4) ALA should support latency, jitter, throughput, and packet loss measurements between the NNI and UNI-N using an as yet undefined NICC profile of Y.1731.

[R6-6-20] (ALA-5.16.2) ALA-users should be able to determine whether the performance between the NNI and UNI is within the service contract.

[R6-6-30] (ALA-5.16.3) ALA-users should be able to access an historical record of service performance parameters.

[R6-6-40] (ALA-5.18) The ALA provider shall notify the ALA-user if it becomes unable to support the contracted CIR due to reduced bandwidth (for example due to Digital Subscriber Line(xDSL) channel dynamics).

7 Backhaul Requirements

Different network interconnection points will be suited to different operators (e.g. due to different numbers of end-users and levels of traffic). Traffic levels are also likely to change over time. Therefore, it is important that Ethernet ALA supports flexible interconnection locations. This may require the definition of a backhaul specification in addition to an Ethernet ALA specification.

[R7-10] (ALA-I.1) The ALA specification shall not preclude interconnect at any local, regional, or national active points, either directly or via a backhaul product.

Note: The commercial availability of interconnect at any particular point in the network is beyond the scope of this document.

8 UNI Requirements

This section describes requirements for the User to Network Interfaces at the end-user premises supported by Ethernet ALA.

8.1 Physical Requirements

[R8-1-10] (ALA-C.1) Where an NTU is used at the customer premise, the Ethernet ALA User Network Interface (UNI) shall be an IEEE 802.3 [i.5] interface.

[R8-1-20] (NGN-5.3) The ALA provider shall offer the ALA-User a UNI using an electrical RJ45 connector.

8.2 Service Presentation

[R8-2-10] (ALA-C.3) The ALA NTU shall allow the end-user to receive multiple services concurrently from different ALA-users.

[R8-2-20] (ALA-C.3) ALA shall support the delivery of traffic from more than one ALA-user through a single physical port at the end-user premises.

Note: For the avoidance of doubt, it is possible for a customer to receive a combined package of services from a single ALA-user.

[R8-2-30] (ETH-WG) ALA shall support delivery of traffic from different ALA-users through separate ports on the NTU.

[R8-2-40] (ETH-WG) ALA shall support a wires only interface.

Note: Some access technologies may not initially be able to meet this requirement.

8.3 Protection

[R8-3-10] (NGN-6.4) ALA may support protection of the link to the end-user site.

8.4 Scalability

[R8-4-10] (ETH-WG) An ALA NTU shall support at least 4 ALA-Users.

[R8-4-20] (ETH-WG) An ALA NTU should support at least 8 ALA-Users.

9 NNI Requirements

This section describes requirements for the Network to Network interfaces at the interconnect point(s) supported by Ethernet ALA and an ALA backhaul service.

9.1 Physical Requirements

[R9-1-10] (NGN-5.2) The NNI shall support the following Ethernet interface type:

- 1000BASE-LX (1310nm)

9.2 Service Presentation

[R9-2-10] (NGN-1) The interconnect shall be able to support multiplexed ALA-user connections.

[R9-2-20] (ALA-I.2) The ALA-provider shall aggregate traffic into a standard-sized Ethernet Network to Network Interface (NNI) to hand off to the ALA-user.

[R9-2-30] (NGN-6) Automatic discovery of EVC bandwidth and Service ID should be supported at the NNI.

9.3 Protection

[R9-3-10] (ALA-I.4) Ethernet ALA shall support NNI protection in order to provide resilience. "1+1" (active + standby) and "load-balancing" mode shall both be supported.

[R9-3-20] (NGN-6.4) The Interconnect may be protected using multiple links, and protected against Link (fibre), Port and Line card failures.

9.4 Scalability

[R9-4-10] (ETH-WG) ALA shall support an NNI interface aggregating traffic from more than 4094 end-users per physical port.

10 Security

Ethernet ALA needs to provide basic transport security, leaving ALA-users with the responsibility to apply the appropriate level of higher layer security to their own traffic.

[R10-10] (ALA-S.1) ALA packets shall identify both the ALA-user and the UNI.

[R10-20] (ETH-WG) The ALA-provider shall ensure layer-two separation between ALA-user connections.

[R10-30] (ETH-WG) The ALA-provider shall prevent layer-two connectivity between end-users.

[R10-40] (ETH-WG) It shall not be possible for the ALA-user or ALA end-user to access management traffic belonging to the ALA-provider.

[R10-50] (ALA-S.2) VLAN tag configuration shall ensure exclusivity of VLAN IDs as appropriate between ALA-users and end-users.

11 Operational Requirements

11.1 Processes

[R11-1-10] (ALA-C.4) The ALA NTU shall allow an ALA-user to provide services without the need for an engineer to visit the premises for the purpose of configuring the Ethernet ALA NTU.

[R11-1-20] (NGN-6) Where discovery of EVC bandwidth and Service ID is not available across the NNI, the ALA-provider shall provide an alternative interface with this information.

11.2 Migration

[R11-2-10] (ALA-5.7) Industry wide standards and processes should be supported to ensure minimum disruption to end-users during ALA-users' migration of their services to different geographies, wholesale products (e.g. Wholesale Line Rental to ALA) and interconnection points.

11.3 Non-disruptive changes

[R11-3-10] (NGN-6.5) The addition of new ALA-user connections or changes to existing ALA-user connections shall not unnecessarily disrupt the operation of any ALA-user connections belonging to any other ALA End-user.

[R11-3-20] (NGN-6.5) The addition of new ALA-user connections or changes to existing ALA-user connections should not disrupt the operation of any other ALA-user connections belonging to the same ALA End-user.

Annex A (informative): Modified or excluded requirements

This Annex provides a discussion on requirements present in the input documents to the NICC working group that have been significantly modified or excluded after discussion by the working group.

A.1 Modified requirements

This section contains a list of the requirements tagged as (ETH-WG) which are derived from NGNuk and Ofcom ALA input requirements.

Derived requirement	Original requirement	Reference
[R6-1-10]	The implementation of Ethernet ALA shall not preclude the implementation of a service VLAN (N:1) model.	(ALA-S.2)
[R6-3-20]	The implementation of Ethernet ALA should not preclude the transparent carriage of C-VLANs in order to provide transparent Local Area Network (LAN) services for business users.	(ALA-S.2)
[R6-3-20]	Q in Q [i.7] customer frames shall be supported.	(NGN-6)
[R6-3-30]	A minimum frame size of 1526 shall be supported.	(NGN-6)
[R6-3-40]	ALA User frames must not be changed by the ALA –Service. This includes 802.1p priority markings. Customer 802.1p bits shall not be translated.	(NGN-6.1)
[R6-3-50]	Ethernet ALA shall transport the control protocols and management channels to allow complete management of CPE.	(ALA-C.6)
[R6-4-80]	It shall be ensured that there is no undue discrimination between traffic from different ALA-users, e.g. if it is marked with the same priority and is subject to the same bandwidth agreements.	(ALA-Q.5)
[R6-4-120]	ALA-users shall be able to define default priorities for each service, to allow a mix of next generation services to be easily delivered to end-users. This will allow services to be delivered without the end-user requiring an understanding of service priorities. End-users shall still have the option to alter this mix by choosing different priorities.	(ALA-Q.15)
[R6-5-80]	The NTU shall provide confirmation of connectivity and power (both through visual indication to the end-user and connectivity back to the network), and this functionality shall be standardised across the industry.	(ALA-C.5)
[R8-2-40]	ALA shall not preclude a future wires/fibre-only option for the UNI presentation. This option shall not be implemented until after relevant standards (e.g. WT-114, WT-115, and FSAN/ITU OMCI) and equipment test-plans have been defined to ensure multi-vendor interoperability.	(ALA-C.1)

Derived requirement	Original requirement	Reference
[R10-20]	It shall not be possible for ALA-users to access end-user or management traffic belonging to another ALA-user or the ALA-provider. It shall not be possible for end-users to access other end-users' traffic or ALA management traffic belonging to ALA-users or the ALA-provider.	(ALA-S.1)

A.2 Excluded Ofcom ALA requirements

This section lists the Ofcom ALA requirements that have been excluded from this document, including:

- Requirements or recommendations on the standardisation process
- Technical specification of the ALA service that will be considered as part of follow-on work.
- Commercial aspects of the ALA service that are out-of-scope of this document.

Ref	Original Requirement	Discussion
C.2	This [ALA UNI] shall (where appropriate) have the same service profiling as the network interconnection point (i.e. how frame tagging is used, how the line rate is defined).	The term 'service profiling' is meaningless without further definition. The specification of the UNI will be part of follow-on work.
C.2	The ALA UNI shall feature a logical interface based on the same Ethernet scheme as the network interconnection with ALA.	This is a subject for further specification and will be covered by the UNI / NNI definition.
C.6	Standardisation shall separate the management of physical/Ethernet connectivity from the management of higher level equipment functionality. This will provide a basis for moving to wires/fibre-only.	The ALA provider is expected to use management interfaces and protocols specific to their access technology where this is used to manage the physical layer configuration of the access link. The working group will review this issue as part of specification projects.
I.1	Any backhaul product shall support the Ethernet service profiling used in the access part of the network, and fully comply with other requirements of Ethernet ALA, e.g. delivering of QoS and information rates.	The intention of this requirement appears to be that all the hand-off points should support the same services. However, the backhaul product chosen by the ALA-user is not the responsibility of the ALA-provider, so this is out-of-scope.
I.3	There shall be a common logical interface at the interconnect handoff, based on the standardised Ethernet service profiling used for traffic separation and prioritisation. It is recognised that QoS may be considered on a more aggregate basis at the network interconnection than at the UNI.	This is a subject for further specification and will be covered by the UNI / NNI definition.

Ref	Original Requirement	Discussion
M.2	The standardisation of Ethernet ALA shall not preclude the implementation of multicast solutions at higher layers, e.g. IP-based multicast.	This is a requirement on the standardisation process. The choice of multicast group membership protocol will be specified as part of follow-on work.
Q.3	ALA shall allow ALA-providers to offer a range of information rate models in their products.	This is covered by other requirements.
Q.6	The ALA-user shall monitor and if necessary police any QoS/CoS requirements from the End-user so that the ALA-provider only acts upon QoS/CoS tags approved by the ALA-User. This will ensure an end-user cannot dominate a shared infrastructure with high priority services.	The ALA-user may translate markings, but this is out of scope of the ALA service.
Q.8	Ethernet ALA shall not preclude the implementation of higher level QoS, e.g. IP-ToS (Type Of Service)	This requirement is covered by the more general transparency requirements.
Q.10	There shall be an appropriate product definition such that both the ALA-user and provider can prove whether services can be delivered, including a contract that defines the capacity of the ALA network provided to the ALA-user.	This is a requirement on standardisation. Testing mechanisms related to Ethernet ALA are within the scope of the NICC Ethernet working group's future work.
Q.11	It shall be the responsibility of the ALA-user to ensure it shapes and polices its traffic at the interfaces with ALA to meet its CIR:EIR contract.	This is an unnecessary requirement on the ALA-user. If the ALA provider polices the traffic, it would be optional whether the ALA user shaped the traffic, depending on his attitude to packet loss.
Q.13	ALA shall not preclude the ALA-user from being able to define and agree, with the ALA-provider, the specific parameters of the VDSL line profiles to best support the ALA-user's product sets	This requirement is out of scope of Ethernet ALA.
Q.14	The functionality to allow multiple ALA-users to provide services to an end-user premise shall not be precluded for the future. For the avoidance of doubt, it should always remain possible for a customer to receive a combined package of services from a single ALA-user.	This is a duplication of requirement C.3.

Ref	Original Requirement	Discussion
S.3	Ethernet ALA shall be transparent to whatever security procedures an ALA-user wishes to run. Therefore controlling access to a set of port IDs, or CPE Media Access Control (MAC) addresses shall not be precluded. Support for Intermediate Agent shall also not be precluded.	The transparency requirement is covered by the existing requirements in section 6.3. Restrictions on MAC addresses and ports seem to be related to the requirement to support N:1 VLAN architectures which has been excluded from this document.
S.4	Standards development shall not preclude the required intercept and tracking functionality, including call line identification and automatic call rejection functionality. Ethernet ALA shall act as a transparent pipe with respect to intercept and tracking	Provided that ALA user packets are always forwarded to an NNI, we believe intercept is out of scope of Ethernet ALA. Ethernet ALA is transparent to CLI. End-user and UNI identification is covered by R-10-10.

A.3 Excluded NGNuk requirements

A.3.1 Topologies

Section 5.4 of the NGNuk document [i.3] states that:

> 'It shall be possible to support MP2MP across the Interconnect where the customer sites are spread across other networks as shown in Figure 1. The reason for this is: Operator Y may have a number of the sites of Operator X's customer in a city. In many cases it may make sense to switch locally rather than to backhaul all traffic to Operator X.'

It was agreed at the scope of Ethernet ALA would be limited to the topologies defined in section 6.1. The working group believes that hairpin switching at the NNI will be sufficient to provide local switching in the case of Ethernet ALA. An Ethernet service provider can interconnect at an NNI close to the end-user if this assists with bandwidth optimisation.

A.3.2 Frame Transparency

The NGNuk document specified the following transparency modes that have not been included as requirements of this document:

- Transparent Throughput Port Mode – the Ethernet transport service is transparent to all protocols and is transparent to frame throughput.
- Transparent Port Mode – the Ethernet transport service is not transparent to frame throughput but is transparent to the main IEEE802.3 protocols.

This allows the specification of standard IEEE 802 interfaces at the UNI and NNI.

A.3.3 UNI Interface Types

Section 5.3 of the NGNuk document provided the following table of interfaces that should be supported at the UNI:

Service Rate (gross)	Presentation/Interface	Connectors
2-10Mbit/s	10 Base T/ 100BaseT	RJ45
10-100Mbit/s	100BaseT	RJ45
100Mbit/s	100Base LX singlemode 1310nm 100BaseSX Multimode 850nm 100BaseT	SC, FC/PC, ST
100-1000Mbit/s	1000Base LX singlemode 1310nm 1000BaseSX Multimode 850nm 1000BaseT	SC, FC/PC, ST

The working group believes that the most appropriate interface to provide Ethernet ALA will be a 10/100/1000BASE-T Ethernet interface using an RJ45 connector, and that specifying a requirement for multiple interface types will not add value. This does not preclude an ALA-provider from offering other interface types at the UNI.

A.3.5 CoS translation

Section 6.1 of the NGNuk document specifies that:

"The Interconnect shall support a means to translate between classes of service. The actual classes of service that inter-work shall be agreed between the interconnecting operators and a process that manages the translation table will be required."

The working group believes that an such Class of Service translation should be the responsibility of the ALA-User and so is out-of-scope of this document.

A.3.6 Performance Indicators and Targets

Section 7 of the NGNuk document specifies example requirements for:

- Lead time to deliver service;
- Target Time to Repair; and
- Service Availability.

This document does not include requirements in this area because the targets were not finalised and an abstract requirement to have targets would be meaningless.

History

Document history		
V1.1.1	08/02/2010	Approved Version