

## Quality Statement

AMS-IX offers high quality services on a technologically advanced and resilient platform supported by a professional organisation. In practice this means we are offering carrier grade service levels<sup>1</sup>.

All our connected members receive the same high level of service based on the quality parameters in this document. These parameters have been defined by the need to comply with the high quality expectations of our members. The parameters are continuously monitored and measured by probes in the monitoring platform. Connected to each of the access routers is a “probe” which measures the performance of the connection over the AMS-IX Infrastructure towards the other probes.

## Service Demarcation

AMS-IX is responsible for the correct functioning of its switching infrastructure. The AMS-IX service consists of delivering, operating and interconnecting member ports on our switches, including service from the member ports up to and including the local AMS-IX patch panel. The member is responsible for the necessary cabling between the member's router and the AMS-IX switch patch panel through the arrangements made with an AMS-IX co-location or in case of a remote layer-2 connection, arrangements made with a partner/carrier. The member is always responsible for arranging their own BGP peering with other AMS-IX members and for the correct functioning of their own infrastructure, i.e. router equipment.

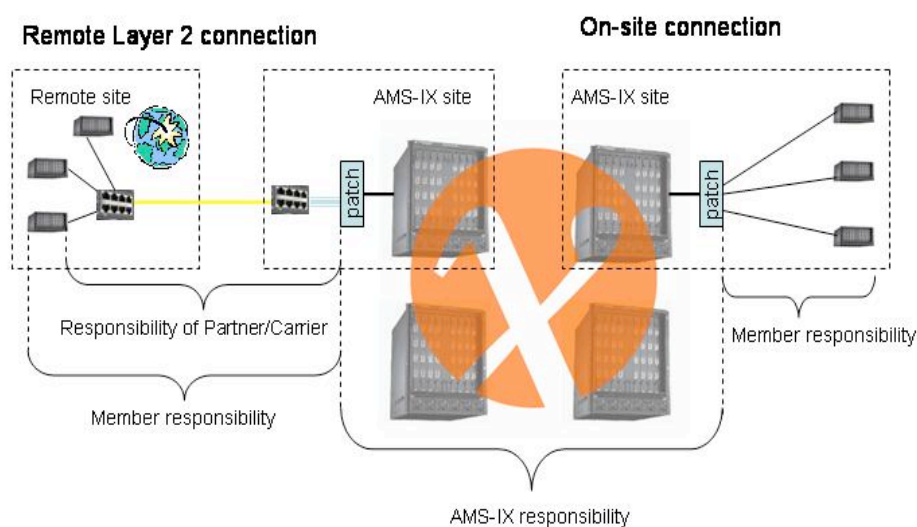


Figure 1: Responsibility diagram

<sup>1</sup>This Quality Statement does not have penalty schemes associated with it. A Service Level Agreement (SLA), that includes service penalties can be ordered. Please contact AMS-IX sales (sales@ams-ix.net) for further details on this.

## **Service Delivery**

### *Initial connection*

The initial provisioning of a Customer Connection will take a maximum of five (5) working days (Mon-Friday 9.00-18.00 CET) after acceptance of the Customer order, providing that the customer has an agreement with the chosen AMS-IX colocation and after return of the signed AMS-IX Connection Agreement by the candidate customer, or on the envisaged date of Connection, as indicated by Customer in the port request form.

The acceptance process to the Association may take up to 3 working days.

Upon first delivery of service the port will initially be placed in the quarantine VLAN. This allows the member to physically install/configure their router and other equipment at the housing location(s), finalise the cabling arrangements with the co-location or layer-2 service provider and subsequently verify basic (L1/L2 and ping) connectivity to the AMS-IX platform. Also, this stage of the process allows the AMS-IX NOC to verify that the member's equipment is configured according to the AMS-IX rules for connecting. Once this is done and the AMS-IX NOC has concluded that the interface is "clean" (see item service quality), the interface is placed into the appropriate production VLAN.

### *Connection changes*

For changes in the configuration without contractual implication we schedule a provisioning time of 3 working days.

For configuration changes with a contractual implication, e.g. additional connections or port upgrades, we schedule a provisioning time of a maximum of 5 working days after receipt of the signed revised Connection Agreement.

The member can always indicate his own envisaged date of delivery, which AMS-IX will honour as much as possible.

The change Provisioning only applies to 1GE and 10GE ports, until otherwise mentioned 100GE ports are excluded currently.

## **Network & Service Availability**

The aim of the AMS-IX Network Operations Centre is to have a network availability of at least 99.99%. AMS-IX considers both service interruption as well as deterioration of service as service failure.

Excluded from this definition are service failures due to:

- ⇒ scheduled maintenance
- ⇒ violations of AMS-IX regulations by members causing dis-functioning of the exchange
- ⇒ force majeure

Service deterioration is defined as not performing according to the set performance parameters outlined below.

## Service Quality

### Port Hygiene

AMS-IX strives to maintain very high levels of quality of service for all of its members. We are able to maintain this high service quality because of our rigorous testing of new installations and equipment, our adhering to standard procedure where possible, while being flexible where necessary. In addition we make sure when connecting new members that the member is aware of, and adheres to, the rules for allowed traffic types on the AMS-IX infrastructure. These rules are enforced in part by actively monitoring the platform, in part by switch configuration statements. In this way we limit the potential risk, that is inevitably present in a layer 2 network environment, of ill-behaving member equipment adversely affecting other members' service. We sometimes refer to these rules as 'port hygiene measures'.

### Service quality targets

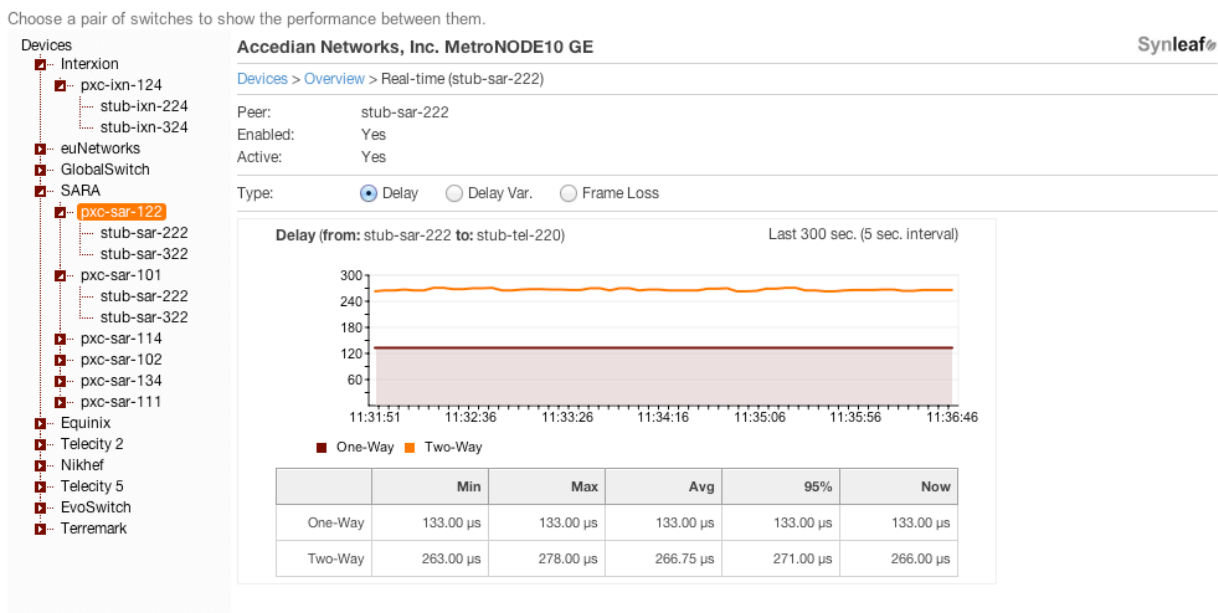
Port availability ('uptime')*	The individual service availability objective per port is at least 99,99 % per year.
Packet loss**	The packet loss between two typical customer ports on the AMS-IX platform should be less than 0.05% in any 24 hour timeframe. An exception is made for ports with a 5 minute average traffic load larger than 70% for either incoming or outgoing traffic. Packet loss is measured between ports on each access switch on the AMS-IX platform. These ports are used as being representative for customer ports. Measured packet loss between these ports should be less than 0.05% in any 24 hour timeframe.
Packet delay***	Packet delay is measured between ports on each access switch in the AMS-IX platform. These ports are used as representation for customer ports on these access switches. The target performance in packet delay is for 97.5% of the packets to have a delay less than 0.5 ms
Inter packet delay variation (IPDV)	Jitter (or IPDV) is measured between ports on each access switch in the AMS-IX platform. These ports are used as being representative for customer ports on these access switches. The target performance in IPDV is for 97.5% of the packets to be between -0.1 and +0.1 ms.

## Performance Measurement

To measure these KPI's AMS-IX makes use of Delay Measurement Messages provided by the ITU-T Y.1731 Ethernet OAM standard. Every switch in the network has a measurement probe attached to it which exchanges these messages over the platform in a separate VLAN. The measurement frames are sent out 10 times per second for delay and jitter measurements, and once per second for frame loss measurements.

## Real-time delay statistics

The values displayed here in real-time are actual values from a single measurement refreshed every 3 seconds (1 minute for frame loss). This gives an indication of the performance of the network.



Graph 1: real-time example from AMS-IX website

## **Trouble ticket support**

Our Network Operations Centre actively monitors the AMS-IX infrastructure 24 hours/day, 7 days/week. Problems can be reported to the AMS-IX NOC via email or telephone.

When a problem is reported, the AMS-IX NOC opens a trouble ticket and assigns an engineer to resolve the problem. The member is kept up to date of resolution by email. In exceptional cases, e.g. when a member cannot be reached via email because of the reported network failure, the NOC can agree to keep the member's staff up-to-date by phone instead. In case of service failure (disruption or deterioration) we aim to resolve within 4 hours of reporting. Other issues or requests will be resolved as soon as possible. A ticket will not be closed without the member's consent.

In case a member feels there is a need to escalate a problem, the requests are relayed to our Chief Technical Officer.

All trouble tickets can be reviewed through the member portal on the AMS-IX website. In many cases problems are discussed on our interactive [tech-l@ams-ix.net](mailto:tech-l@ams-ix.net) mailing list to which the AMS-IX NOC and most members' technical contacts are (or can be) subscribed

## **Maintenance**

To ensure the required Quality of Service and facilitate continuous growth, the AMS-IX platform is maintained on a day-to-day basis and upgraded regularly. Such upgrades are always carried out during scheduled maintenance, for which two maintenance window time frames are in use:

- Non-disruptive maintenance: Mondays to Fridays between 00:00 and 04:00 hours CET.
- Disruptive (or potentially disruptive) maintenance: Tuesday or Thursday between 04:00 and 06:00 hours CET.

Scheduled maintenance is always announced to the following mailing lists: tech-l, grxtech and ops-announce-l.

Scheduled maintenance is defined as follows:

- A period of time during which the AMS-IX platform may not perform at the usual quality level. This is typically related to work being done to fix or improve the platform. Scheduled maintenance is always announced to the relevant mailing lists at least 72 hours before it is taking place.

In addition to the above, it may occur that equipment needs to be replaced immediately, because of hardware or software malfunctioning detected by the AMS-IX NOC. In such cases the replacement work may involve so called Unscheduled Maintenance which will also be announced to the above mentioned mailing lists, however it will not be announced well in advance. This, of course, follows from the immediate nature of the required repair activity and is always up to the discretion of the AMS-IX technical team.