



AMS-IX INTER-IPX SERVICE LEVEL AGREEMENT

Inter-IPX SLA version 2019- v12

1 Introduction

This Inter-IPX Service Level Agreement (SLA) forms part of the Customer Connection Agreement (CA) between the Customer and AMS-IX if so indicated in the CA. The term of this SLA follows the term of the CA, and termination of such CA shall constitute termination of this SLA.

In case of a conflict between the terms and conditions of the AMS-IX Connection Agreement and this SLA, the terms and conditions of the AMS-IX Connection Agreement shall prevail.

This SLA is applicable to the delivery and operation of the Inter-IPX Connection to the AMS-IX Infrastructure by AMS-IX to the Customer. This SLA defines the service levels, the quality of the services, the service credits for non-delivery, unavailability or underperformance and the processes and procedures to be followed, and provides a mutual understanding of service level expectation.

Capitalized terms as used in this SLA shall have the meaning as set out in the CA or the AMS-IX General Terms and Conditions (GTC).

2 Limitations

1. This SLA is only valid if the 5-minute average load on one of the two redundant regular AMS-IX Connections as described in chapter 3 of the applicable Customer Inter-IPX Connection does not exceed 70% of its maximum capacity in a given month.
2. This SLA is only applicable to the Customer Inter-IPX Connection as long as the Customer is in compliance with all the terms and conditions as set out in the CA and GTC.
3. This SLA is only applicable to the Customer Inter-IPX Connections in datacenters certified by AMS-IX as listed on the AMS-IX website.
4. Border Gateway Protocol routing issues are specifically excluded from this SLA.

3 Service Definition

This SLA is provided on the Inter-IPX Connection to the AMS-IX Infrastructure and is applicable to availability of the Connection to and the performance of the traffic on the AMS-IX Infrastructure. An Inter-IPX Connection consists of two redundant regular AMS-IX Connections and can be one of the following:

- A set of two Single GE connections on two different AMS-IX locations (Fig. 1)
- A set of two Multiple GE connections in a so-called link aggregated group (LAG) configuration, of which one set individually is considered one regular connection, on two different AMS-IX locations (one LAG at one location the other LAG at another location)

- A set of two Single 10GE connection on two different AMS-IX locations (Fig. 1)
- A set of two Multiple 10GE connections in a so-called LAG configuration, of which one set individually is considered one regular connection, on two different AMS-IX locations (one LAG at one location the other LAG at another location).

A LAG consists of 2 or more single connections (connection members) of the same bandwidth that together behave as a single logical connection, i.e. two times a single 1GE connection forming a logical 2GE connection. An Inter-IPX Connection that uses LAG configuration will then always consists of two redundant LAG connections forming one Inter-IPX Connection.

The Customer Inter-IPX Connections (or the individual members of the two LAG) are terminated on the AMS-IX patch panel. This patch panel is the demarcation point between the Customer and AMS-IX. See Figure 1 for a schematic layout of the setup. The responsibility for the (LAG) connection between the Customer's router and the AMS-IX patch panel is with the Customer. The responsibility for the (LAG) connection from the AMS-IX patch panel is with AMS-IX. In case of a LAG connection not all member connections of the LAG necessarily terminate on the same patch panel.

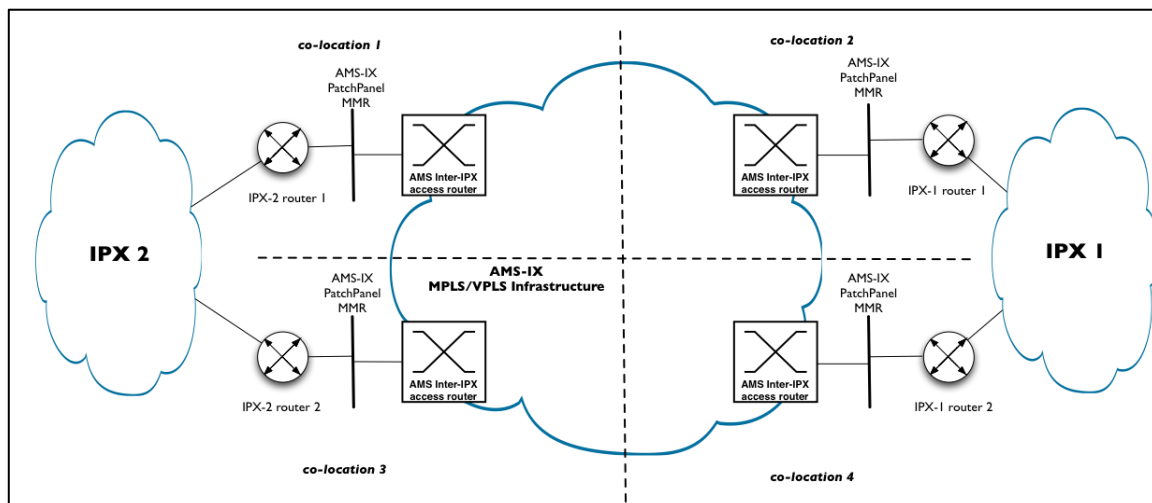


Figure 1 : Inter-IPX customer connection on AMS-IX platform. The AMS-IX patch panel is the demarcation point for responsibility

Connections are further specified as described on: <https://www.ams-ix.net/ams/documentation/interface-cabling-specifications>

4 Service Provisioning

4.1 Initial Inter-IPX Connection

The initial provisioning of a Customer Inter-IPX 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 signed a colocation agreement with a datacenter certified by AMS-IX and after return of the signed AMS-IX Connection Agreement by the Customer, or on the envisaged date of Connection, as indicated by the Customer in the port request form.

Upon first provisioning of service, at the Assignment Date, the individual ports (separately) will be placed in the quarantine VLAN. This allows the Customer to physically install/configure his router and other equipment at the housing location(s), finalize 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 Infrastructure. Also, this stage of the process allows the AMS-IX NOC to verify that Customer's equipment is configured according to the conditions for connecting as set forth in article 7.5 of the GTC. Once this is done and the AMS-IX NOC has concluded that the interface is free of any errors and/or unwanted traffic, it is placed into the appropriate production VLAN, which defines the Production Date. Provisioning is deemed to be at the Assignment Date.

4.2 Inter-IPX Connection changes

For changes in the configuration without contractual implication, AMS-IX schedules a provisioning time of three (3) working days. Orders have to be placed using the my.ams-ix.net portal.

For configuration changes with a contractual implication, e.g. additional connections or port upgrades, AMS-IX schedules a provisioning time of a maximum of five (5) working days after acceptance of the order and receipt of the signed revised Appendix of the AMS-IX Connection Agreement. Orders have to be placed using the my.ams-ix.net portal.

The Customer can always indicate its own envisaged date of delivery, which AMS-IX will honor as much as possible.

5 Availability of the service

The aim of the service availability is 99.995% per month. AMS-IX defines availability as the amount of time per month that the AMS-IX Infrastructure and the connection under consideration to it are available to the Customer.

To calculate availability the following formula is used:
$$P = \frac{A-B-C}{A-B} * 100$$

Where:

- A = Number of hours in a month
- $B = \sum_{i=1}^n B_i$ Sum of all outages due to announced maintenance,
- $C = \sum_{j=1}^m C_j$ Sum of all outages
- P = Availability percentage

AMS-IX considers the service unavailable when:

- The Inter-IPX Connection of the Customer to the AMS-IX Infrastructure is not operational due to a problem within the responsibility sphere of AMS-IX (see fig. 1 and 2)
- The Inter-IPX Connection of the Customer to the AMS-IX Infrastructure is operational but 5% or more of the other Customer's routers in the same Inter-IPX LAN are unreachable
- If the Inter-IPX Connection of the Customer consists of a so called LAG and one or more of the individual links in this LAG are down due to a problem within the

responsibility sphere of AMS-IX and the average traffic load on the remaining links exceeds 70%.

The unavailability period starts when:

1. An authorized Customer representative contacts the AMS-IX NOC (+31 20 5200 300) to open an SLA-case and a trouble ticket in mutual agreement

Or

2. A trouble ticket has been opened by the AMS-IX NOC after a customer-affecting problem is detected. The affected customers will be mentioned in the trouble ticket

The unavailability ends when the trouble ticket is closed in mutual agreement in case of 1, providing the Customer 24 hrs availability, or by the AMS-IX NOC in case of 2.

Exceptions to the unavailability (C in the formula) are:

- Photonic cross connect swaps in the AMS-IX Infrastructure and relating to 10GE ports below 200 milli-seconds
- Prolonged swap time after a photonic cross-connect swap due to certain conditions. In case such a condition exists, the AMS-IX NOC while testing the Customer's port(s), will notify the Customer about this. Examples are:
 - in case Customer uses LACP for port aggregation
 - in case Customer is connected behind a DWDM infrastructure on which the swap is not correctly propagated.
- Outages needed for requested change orders to the connection by the Customer.
- Outage periods reported by the Customer in which no fault is observed or confirmed by AMS-IX
- Outages due to force majeure

6 Performance of the service

The AMS-IX Infrastructure is considered degraded if one of the measured Key Performance Indicators (KPI) between one Inter-IPX customer and another Inter-IPX customer is experienced at a rate larger than the aimed service level. The monitored and measured KPI with their target values are:

KPI	Target value	Description
Packet Loss	<0.05%	Average per hour in 24 hour period
One Way Delay	<500 micro-seconds	Average per hour in 24 hour period
One Way Delay variation	<100 micro-seconds	Average per hour in 24 hour period

The defined KPI's support the highest Quality of Service Type or Traffic Class in the associated GSMA documentation (GSMA IREG PRD IR.34), namely Traffic Class Conversational. The calculation of the various KPI parameters follows the definitions as described in GSMA IPX PCI document PTG-DL017.

The KPIs are continuously monitored and measured by probes in the monitoring platform. These measurements are indicators of the performance and are expected to be similar, but

not necessarily the same, as experienced by Customer. If the measurements of Customer on its Inter-IPX Connection deviates from the published performance indicators and exceeds the numbers in the agreed SLA, Customer is entitled to open an SLA-case with the AMS-IX NOC.

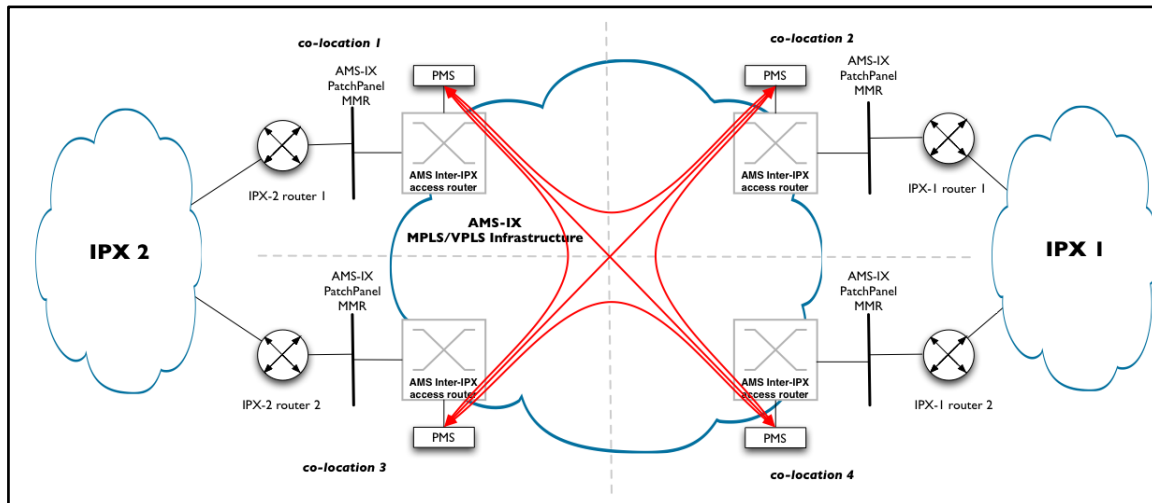


Figure 2: Inter-IPX connections and probe set-up in the platform

Figure 2 shows the AMS-IX access routers, each located in a different AMS-IX location. Connected to each of the access routers is a “probe” which measures the performance of connections over the AMS-IX Infrastructure towards the other probes.

The probes are Accadian MetroNID (GE connection) or MetroNODE (10GE connection) and measure:

- Packet Loss
The average amount of packets lost between two probes in a 24-hour period
- One way delay
The average one-way packet delay per hour between two probes in a 24-hour period
- One way delay variation
The average one-way packet delay per hour between two probes in a 24-hour period

The start of the degraded service starts when:

1. An authorized customer representative contacts the AMS-IX NOC (+31 20 5200 300) to open an SLA-case and open a trouble ticket in mutual agreement.

or

2. A trouble ticket has been opened by the AMS-IX NOC after a customer-affecting problem is detected. The effected customers will be mentioned in the trouble ticket.

The degradation ends when the trouble ticket is closed in mutual agreement in case of 1 or by the NOC in case of 2 (providing 24 hrs Customer availability).

The measured KPI's are reported at <https://stats.ams-ix.net/rt-stats.html>

The performance indicators as measured by AMS-IX are limited to the AMS-IX Infrastructure and do not include the Customer links. To compare the KPI's experienced by the Customer with the KPI's measured and published by AMS-IX the 5 min average load on the individual regular connections forming the Customer Inter-IPX Connection should not exceed 70% of the maximum capacity.

7 Scheduled Maintenance

Scheduled maintenance is a necessary element of network operations and therefore not counted as “service unavailability”.

AMS-IX NOC will announce maintenance at least 72 hours in advance by e-mail to the relevant technical distribution lists. For example, these are tech-l@ams-ix.net for the Internet Peering LAN, grx-tech@ams-ix.net for the GRX peering LAN and ipx-tech@ams-ix.net for the IPX peering LAN. The notification will include at least the following information:

- Start date and time of the maintenance
- Expected end date and time of the maintenance
- Expected impact on availability and AMS-IX Infrastructure performance
- Impacted customers

Scheduled maintenance is confined to the following periods:

- * Monday to Friday between 04.00 CET and 06.00 CET when a service interruption for any customer connection is expected
- * Monday to Friday between 00.00 CET and 06.00 CET otherwise
- * In rare cases where scheduled maintenance with potential service interruption needs longer time windows it will be announced at least 2 weeks in advance.

To make sure that maintenance announcements are seen by the Customer, it is the responsibility of the Customer to make sure the relevant contact details are registered and known to AMS-IX.

8 SLA Reporting

Reporting on the general service level performance of AMS-IX will be done real time at <https://stats.ams-ix.net/rt-stats.html>

Also an individual monthly SLA report will be made available through the Customer specific my.ams-ix.net website within 10 working days after the end of the preceding month. Each month the Customer will be notified of the posting of the report. The Customer needs to accept or reject the report for SLA's met, 10 working days after notification the report will be accepted automatically. After a report has been accepted no more service credits apply to the particular period.

In case of rejection of the report the dispute resolution process starts.

9 Cases, trouble tickets and escalation

The AMS-IX NOC actively monitors the AMS-IX Infrastructure 24 hours/day, 7 days/week. SLA customers will report outages via telephone (+31 20 5200 300). The NOC will open a trouble ticket.

When a trouble ticket is opened, the AMS-IX NOC assigns an engineer to resolve the problem. Customer is kept up to date of case resolution by email. A ticket opened for an individual Customer will not be closed without the Customer's consent (providing that the Customer is reachable via its designated contacts as set forth in article 4.3 in the GTC). Upon resolution the NOC will close the SLA-case.

In case the Customer needs to escalate a problem, the requests are relayed to the Chief Technical Officer of AMS-IX.

All SLA-cases and trouble tickets can be reviewed through the customer portal on the AMS-IX website https://my.ams-ix.net/trouble_tickets. In many cases incidents with a larger impact are discussed on our interactive grxtech@ams-ix.net and ipxtech@ams-ix.net mailing lists to which the AMS-IX NOC and the Customer's technical contact(s) are subscribed.

10 Service Credit Scheme

Upon late delivery, unavailability or underperformance, the Customer can request service credits from AMS-IX relating to the applicable Customer Connection. Service credits need to be requested through the customer environment in my.ams-ix.net within 10 days following the SLA report. AMS-IX will process the service credit request within three (3) working days and report back to Customer.

Note: Not more than 100% of the monthly fee is credited in any given month. In case of several incidents in a particular month AMS-IX will aggregate the requested service credits. A combination request of Availability and Performance service credits for one incident is not accepted, service is either unavailable or degraded, not both at the same time.

In case a service credit request is submitted, Customer is required to pay outstanding and future invoices as they are submitted without anticipating the service credit. Once the service credits are accepted and/or disputes settled AMS-IX will offset any service credit on the next following invoice.

10.1 Initial delivery & changes

In case the initial delivery and implementation or changes exceeds the target time the below service credits apply. Any process that is delayed due to events outside AMS-IX control or due to the Customer's or third party actions does not apply for service credits. If the Customer requests changes to the initial order the process shall start again from that date.

Type	Measure	Monthly Service Credit
Initial port	Over 5 working days	50%
	Over 10 working days	100%

Non-contractual impact changes	Over 3 working days	50%
	Over 6 working days	100%
Contractual impact changes		As above at ports.

Requested and agreed service credits for initial service delivery will be applied to the first invoice the Customer receives. In case of fees waived for the first month of service no credits shall apply.

Requested and agreed service credits regarding changes shall be applied on the next scheduled invoice the Customer receives.

10.2 Availability

In case the Customer experiences a service availability below the targeted availability during a given month, Customer is entitled to request a service credit according to the table below. The percentage is applied as a decrease to the monthly service fees.

Monthly Calculated Availability (P)	Approximate Monthly Minutes downtime*	Monthly Service Credit
$P \geq 99.995\%$	0-2.2	0%
$99.995\% > P \geq 99.95\%$	2.2-22	50%
$P < 99.95\%$	>22	100%

* depends on actual number of days in the month.

10.3 Performance

In case one of the Key Performance Indicators (KPI) between one Inter-IPX customer and another Inter-IPX customer is experienced and measured at average in a 24- hour period as in the table below the Customer is entitled to request a service credit according to the table.

KPI	Measured value	Monthly Service Credit
Packet Loss	$0.05\% \leq \% \text{ value} \leq 0.1\%$	25%
	$\% \text{ value} > 0.1\%$	50%
One Way Delay	$500 \mu\text{s} \leq \text{delay value} \leq 1000 \mu\text{s}$	25%
	$\text{delay value} > 1000 \mu\text{s}$	50%
One Way Delay variation	$100 \mu\text{s} \leq \text{jitter value} \leq 200 \mu\text{s}$	25%
	$\text{jitter value} > 200 \mu\text{s}$	50%

This service credits scheme as set out in this paragraph 10 constitutes the Customer's sole remedy with respect to late delivery, unavailability or underperformance of the services rendered by AMS-IX.

11 Dispute Resolution

The Customer can start a procedure to dispute the SLA report (including individual cases) by sending in a dispute report through the individual customer environment on my.ams-ix.net. The dispute report must be filed within 30 days following the report issue and is also subject to the condition that Customer has rejected the SLA report within 10 working days in accordance with Chapter 8. After the 30 days period, no service credits will be awarded.



AMS-IX NOC will process the dispute report, and will conduct a thorough investigation. AMS-IX will inform the Customer, aiming to resolve the dispute based on its findings, and issue any service credits if applicable. In case the Customer is not satisfied with the resolution, the dispute will be escalated to the AMS-IX Management Team.