Agenda

- GRX brief background and setup
- GRX to IPX, what’s changing?
- IPX GSMA recommendations
- IPX Implementation AMS-IX Amsterdam
GRX
(a slightly lesser known AMS-IX service)
So what is GRX?

- GRX = GPRS roaming exchange.
- Exchanging GPRS and 3G roaming data.
- Private IP network (separate from the internet).
- Limited to GSM operator community.
GRX

‣ Since 2002 AMS-IX offers its GRX platform (CUG) to carriers that interconnect MNO’S for **data roaming** purposes:

‣ Technical: GRX VLAN, GSMA supplied Root DNS and dedicated equipment and connection

‣ Administrative (‘accreditation’): Memorandum of Understanding

‣ AMS-IX the main GRX peering point globally, interconnecting 25 GRX providers.
AMS-IX ‘Inter-GRX’ platform to allow for data roaming
GRX members on AMS-IX platform

Aicent
Astelnet
Belgacom ICS
CITIC Telecom
Comfone AG
Deutsche Telekom
Emirates Telecommunications
France Telecom
iBasis
MTT
MTX Communications
NTT Communications
OTEGlobe
Portugal Telecom
SAP (form. Sybase 365)
Syniverse
Tata Communications
TDC Solutions
Tele 2
Telecom Italia Sparkle
Telefonica IWS
Telekom Austria
Telenor Global Services
TeliaSonera ICS
Telstra

https://www.ams-ix.net/connected_parties

These ‘GRX providers’ interconnect their customers, MNOs
GRX Traffic

Peaking during summer and new years’ eve

https://www.ams-ix.net/technical/statistics/grx-statistics
To put this into perspective...

So GRX traffic does not even amount to 0.1% of the total amount of traffic passing through the AMS-IX switch fabric...

https://www.ams-ix.net/technical/statistics
Growth of Mobile Internet Traffic continues to explode


At AMS-IX GRX traffic growth is twice that of ‘regular’ internet traffic
However, what about the long term ‘best effort’ GRX-business case?

- Roaming rates under (regulatory) pressure.
- Volume of voice minutes continues to drop.
- End users using OTT players.
- Multimedia ip-services need to be accessible to end-users ‘securely’ and without ‘delay’, no matter how and where they connect: not supported by GRX
- Does future (roaming over) **LTE** require **QoS**?
‘Broadening the scope’

GRX “evolved” to IPX
So in 2007 GSMA defined the IP eXchange, the ‘IPX’:

“Inter-Service Providers IP Backbone Guidelines  PRD IR.34”
Core Enhancements GRX to IPX

- Introduces additional stakeholders – content providers, FNOs, ASP’s etc
- IPX requires ‘end to end’ guaranteed QoS and security: cascading SLA’s and billing
- Different service classes are defined - GRX is just one of the services within the IPX environment, in a ‘lower’ service class
Idea in 2010: AMS-IX as a catalyst for IPX?

Excellent historic ‘best effort’ track record of neutral one-stop-shop AMS-IX: platform performance and availability of service, as well as capability to handle expected traffic growth
AMS-IX Inter-IPX
AMS-IX created an IPX Interconnect peering platform, according to industry requirements:

- Separate IPX VLAN, minimum of two (redundant) customer ports per connection, on different ‘certified’ AMS-IX co-locations

- AMS-IX committed to KPI’s as mentioned in IR.34, based on highest service class (‘conversational’) requirements

- Introduce one AMS-IX IPX Interconnect SLA

- Monitoring and reporting to show SLA compliance: probe set-up
  - http://www.ams-ix.net/inter-ipx/
## Traffic Classes (GSMA IR34)

<table>
<thead>
<tr>
<th>Application</th>
<th>protocol</th>
<th>PHB</th>
<th>Potential QoS class name</th>
</tr>
</thead>
<tbody>
<tr>
<td>VideoShare</td>
<td>N/A</td>
<td>EF</td>
<td>Conversational</td>
</tr>
<tr>
<td>VoIP</td>
<td>RTP</td>
<td>EF</td>
<td>Conversational</td>
</tr>
<tr>
<td>Push to talk</td>
<td>N/A</td>
<td>AF4</td>
<td>Streaming</td>
</tr>
<tr>
<td>Video streaming</td>
<td>N/A</td>
<td>AF4</td>
<td>Streaming</td>
</tr>
<tr>
<td>Unrecognized GTP traffic</td>
<td>N/A</td>
<td>AF3</td>
<td>Interactive</td>
</tr>
<tr>
<td>DNS</td>
<td>DNS</td>
<td>AF3</td>
<td>Interactive</td>
</tr>
<tr>
<td>Online gaming</td>
<td>N/A</td>
<td>AF3</td>
<td>Interactive</td>
</tr>
<tr>
<td>WAP browsing</td>
<td>GTP_C, GTP_U</td>
<td>AF2</td>
<td>Interactive</td>
</tr>
<tr>
<td>WEB browsing</td>
<td>N/A</td>
<td>AF2</td>
<td>Interactive</td>
</tr>
<tr>
<td>Instant messaging</td>
<td>N/A</td>
<td>AF1</td>
<td>Interactive</td>
</tr>
<tr>
<td>Remote conn.</td>
<td>SSH, telnet</td>
<td>AF1</td>
<td>Interactive</td>
</tr>
<tr>
<td>Email sync</td>
<td>N/A</td>
<td>BE</td>
<td>Background</td>
</tr>
<tr>
<td>MMS</td>
<td>SMTP</td>
<td>BE</td>
<td>Background</td>
</tr>
</tbody>
</table>

AMS-IX will not distinguish between service classes but will focus on the aggregate KPI’s that apply to the highest class: (‘conversational’ /EF )
GSMA IR.34 QoS Parameters

• Service Availability
• Packet loss
• Delay
• Jitter
GSMA IR.34

Availability: 99.995% per month
Packet loss: < 0.1% Highest service (EF +AF4)

Jitter:
- Intra-continent - 5mS
- Inter-continent - 10mS
What happened since 2011 service launch?

• Slow process, old business models, still very much focus on voice
  – billing and control: e.g. no local break-out for GRX
• By now 8 carriers connected and using the AMS-IX Inter-IPX service and -SLA
  – (roaming over) LTE seems to be main driver of current momentum
• Others expected to follow soon
  • ‘Critical Mass’
AMS-IX Inter-IPX Service

• Inter-IPX now also available in AMS-IX Hong Kong and AMS-IX Caribbean Exchanges.
Thank you

• Questions?

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