Saving costs through maximising peering relationships

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Introduction

- **Purpose of the presentation**
  - Discuss our observations of the factors which affect the Internet industry within Russia
    - And those which affect Russian ISPs connection to the Global market
  - Provide Layer 2 connection and pricing options to facilitate connection to other European IXPs
  - Provide an overview of the European IXPs
    - How do you choose the right IX for your own organisation

Russian Internet Market

- **One major factor stands out**
  - Transport costs are very high
    - One company admits to charging 500euros per Mb of transit on traffic volumes exceeding 500Mb/s
    - In Western Europe you would be paying 20euros per Mb on this volume

- **Research suggests that this is because:**
  - Low Demand for Supply
  - Not a lot of International players in the market

The Carriers…

- Most carriers had a pot of money and started building from London across Europe

- Size of network loosely relates to the point at which funding ran out
  - Or point at which they decided they had covered the major cities of London Amsterdam Paris and Frankfurt
    - Their footprints were similar because they all reflect a presence in those countries where telecommunications services were initially deregulated
    - Some would argue a tie between the two but western European demand coupled with deregulation drove the look of most pan-euro footprints

- Historically, Moscow and St Petersburg are both seen as places a network should have PoP's but the ability to dig is greatly compromised by the span of network required from Germany

The Demographics…

- Over the last 10 years, the average GDP per capita in Eastern Europe has meant:
  - Fewer domestic computers meaning less demand for Internet service
  - Less proliferation of mobile telecommunications meaning a low voice minutes per capita
  - All important drivers when deciding where next to deploy network

Regulation

- **No EU anti-competitive legislation**
  - Network of different legal requirements on a country by country basis
    - Creating greater uncertainty
    - Greater risk associated with digging across these countries to Russia
- **Russia's Communications Law**
  - Still no transparency in licensing and frequency allocation processes
  - Universal Services Fund
    - All operators have to pay an unspecified percentage of revenues into fund
  - Government has authority to regulate the price of interconnection between independent and dominant operators meaning more transparency in contracts

Network Route

- The main pan-euro providers into Russia try to avoid the terrestrial route and go via Finland and the Baltic
  - Probably resulting in anomalies like Copenhagen being the 8th largest city for IP services in Europe
- Once the terrestrial routes get to Russia, these sort of aberrations may reduce

Points for Consideration

- So in light of all these factors which means that the price of the backhaul to Amsterdam, Milan or London is so expensive….
  - Does it really make sense for Russian ISPs to peer outside of Russia?
    - How much traffic do I need to offload?
- Perhaps with the stimulation of the Demand cycle and the evolution of the Communications Law
  - More operators into Russia to carry your traffic at better prices elsewhere?
- Layer 2 connection
  - Private point-to-point Ethernet connections on ISP international networks
    - Connections terminate in a dedicated Ethernet port, with an individual IP address controlled by you on the carrier ISP router at an Exchange Point
      - Equant, RETN, TeliaSonera direct point to point
      - KPN and others using RosTelecom as tail

Public Exchange Points

- **Connection to Exchange Points offer many benefits**
  - Peering Scale benefits
  - Other services which assist your business
    - DDOS Mitigation
    - VoIP
      - Separate switched infrastructure
      - Termination of voice minutes
      - GPRS data exchange
    - Redundancy
    - Regulatory Assistance
  - Involvement in the wider Internet community

Peering

- Reduces transit costs
- Provides lowest latency path between ISP Customers
- More control over routing
  - Flexibility to route around congested paths
- Redundancy
- Marketing advantage

L2 Cost Benefit Equation

Minimum Cost of Peering $= \dfrac{\text{Cost of Peering}}{\text{PeeringBandwidth}}$

$= \dfrac{\text{Transport} + \text{RackFee} + \text{PortFees}}{\text{PeeringBandwidth}}$

$= \dfrac{3000 + 0 + 970}{10}$

$= 397\$/Mb$

L2 means no rackfees one-off install of 2k

L2 More traffic = More Savings

- Based on 50Mb

$$= \frac{\text{Transport} + \text{RackFee} + \text{PortFees}}{\text{PeeringBandwidth}}$$

$$= \frac{15000+0+1050}{50}$$

L2 means no rackfees one-off install of 2k

$$= 321\$/\text{Mb}$$

L2 More traffic = More Savings

- Based on 155Mb (STM1)

$$= \frac{\text{Transport} + \text{RackFee} + \text{PortFees}}{\text{PeeringBandwidth}}$$

$$= \frac{32000+0+2800}{155}$$

L2 means no rackfees one-off install of 19.5k (STM1) or through RETN 2k

$$= 255\$/Mb$$

BENTO Prospect

- Analyses Netflow Statistics and provides:
  - Graphical information on traffic routes
- Enables you to give a $ indicator to your Financial Director
- For more information ask me or view: www.networksignature.com

European Internet Exchanges: Recent Developments
&
Assistance in finding the right IX for your organisation

Serge Radovcic – Euro-IX

Changes in European IX's

- In recent years there have been some changes in both Internet Exchange <u>models</u> and the <u>issues</u> being faced by these IX's:

<u>Changes in IX Models:</u>

- Introduction of Commercial IX's
- More regional IX's (not only in the largest cities)
- Competition or choice within larger cities
  - Has brought marketing into the picture, something that the more traditional exchanges stayed away from
  - More services being offered
    - Private VLANs
    - Private Interconnections over the switch fabric
    - Service Level Agreements
    - Almost anything the customer wants

Changes in European IX's

- Other issues
  - With the increase in end user accessibility and the range of multi media applications available, traffic over the IX's is on the increase

IX traffic over the last 13 months*

300% growth

(Total peak traffic - Gbps; values 0, 20, 40, 60, 80, 100, 120, 140, 160, 180; months May '03, Aug. '03, Nov. '03, Feb. '04, May '04)
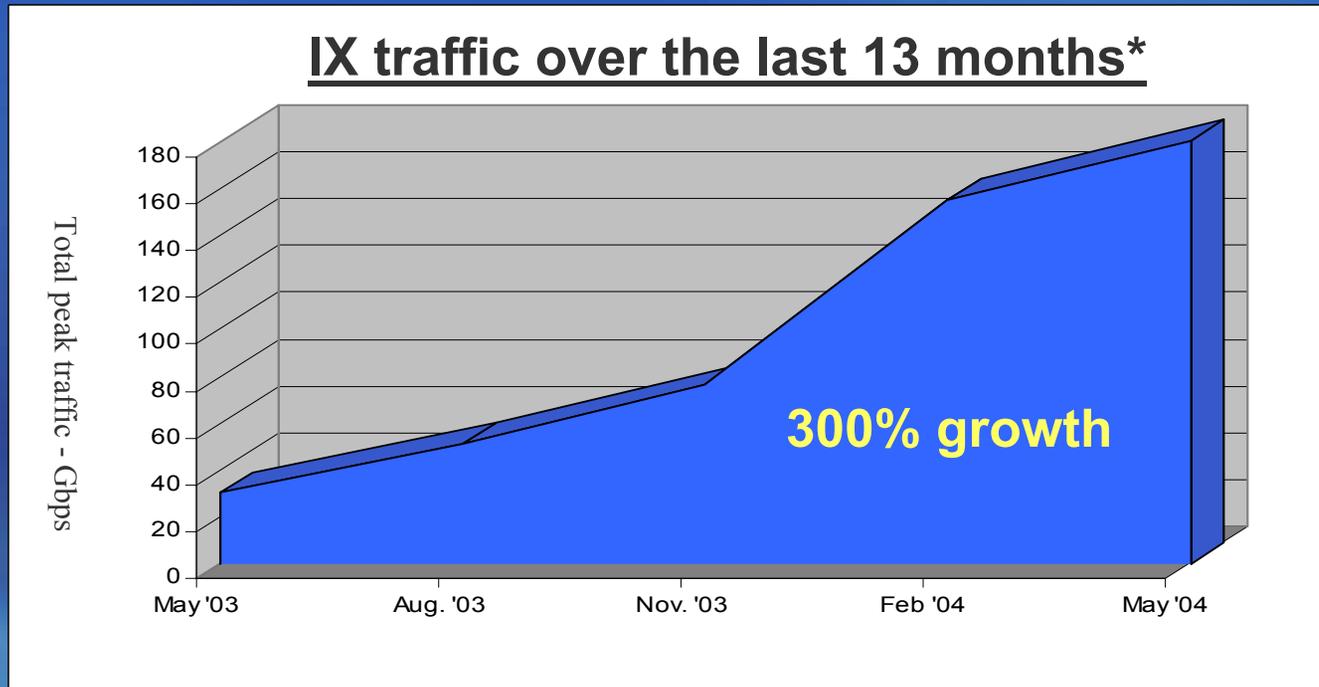
* Figures gathered from publicly available Euro-IX member traffic statistics

Changes in European IX's

- **Other issues:**
  - The exchange infrastructure needs to handle this traffic as well as offering the customers the ability to connect at higher speeds
    - 10Gb Ports are now in production

  - Security over the exchange is playing a more prominent role
  - Exchanges keeping an eye on regulatory issues

    Although the IX models have evolved, it still remains the case that the issues effecting IX's around Europe are quite similar

    With this is mind and competition left aside, it became obvious that one way to tackle these technological challenges was for the exchanges to bring together there knowledge base

    And they did…….

Euro-IX

- The European <u>Internet Exchange</u> Association
- In May 2001, a number of European IX's decided to bring together their knowledge and experience to form the association.

- Main aims:
  1. To act as a forum for discussion of common technical and business issues for IX's in Europe
  2. To act as a portal for ISPs looking to peer in Europe

- Euro-IX is <u>NOT</u> a physical infrastructure connecting IX's and has <u>NO</u> plans to do so!

Euro-IX

- An IX association of this size is unique
- The members/customers of the IX's see the value of their IX joining the Association
- Today Euro-IX has 31 members in 20 European countries
- Members range from commercial to non-for-profit, small to large, and new to well established
- MSK-IX has been a member since 2002
- LINX was one of the founding members
- Interest from other parts of the world
    - New Zealand interested in Network Monitoring tools that have been developed within Euro-IX
    - Japan is very interested in discussions that go on at forums
    - US amazed at ability of so many IX's being able to come together and discuss matters of interest in such an open manner

Euro-IX Member Statistics

- **Average of 5.8 Gbps peak traffic per member IX**
  - At least two member IX's have maximum traffic of over 30 Gbps while another four are now over 14 Gbps

- **A total of 1,614 connected customers**
  - 993 of these have unique ASNs

- **Average of 52 customers per IX**

Cost of Connecting to Euro-IX Member IX's

- The <u>average</u> total cost of a 100 Mb port at a Euro-IX member IX is 1.050 euro per month (US$1.260)

- These costs include:
  - membership fees
  - port connection fees
  - co-location costs

- Excludes transit costs of getting to the IX

The Euro-IX website offers Assistance

- Where can I peer in Europe?

- With whom can I peer?

- How do I make contact with an IX?

Where can I peer in Europe?

- Euro-IX members are located across Europe
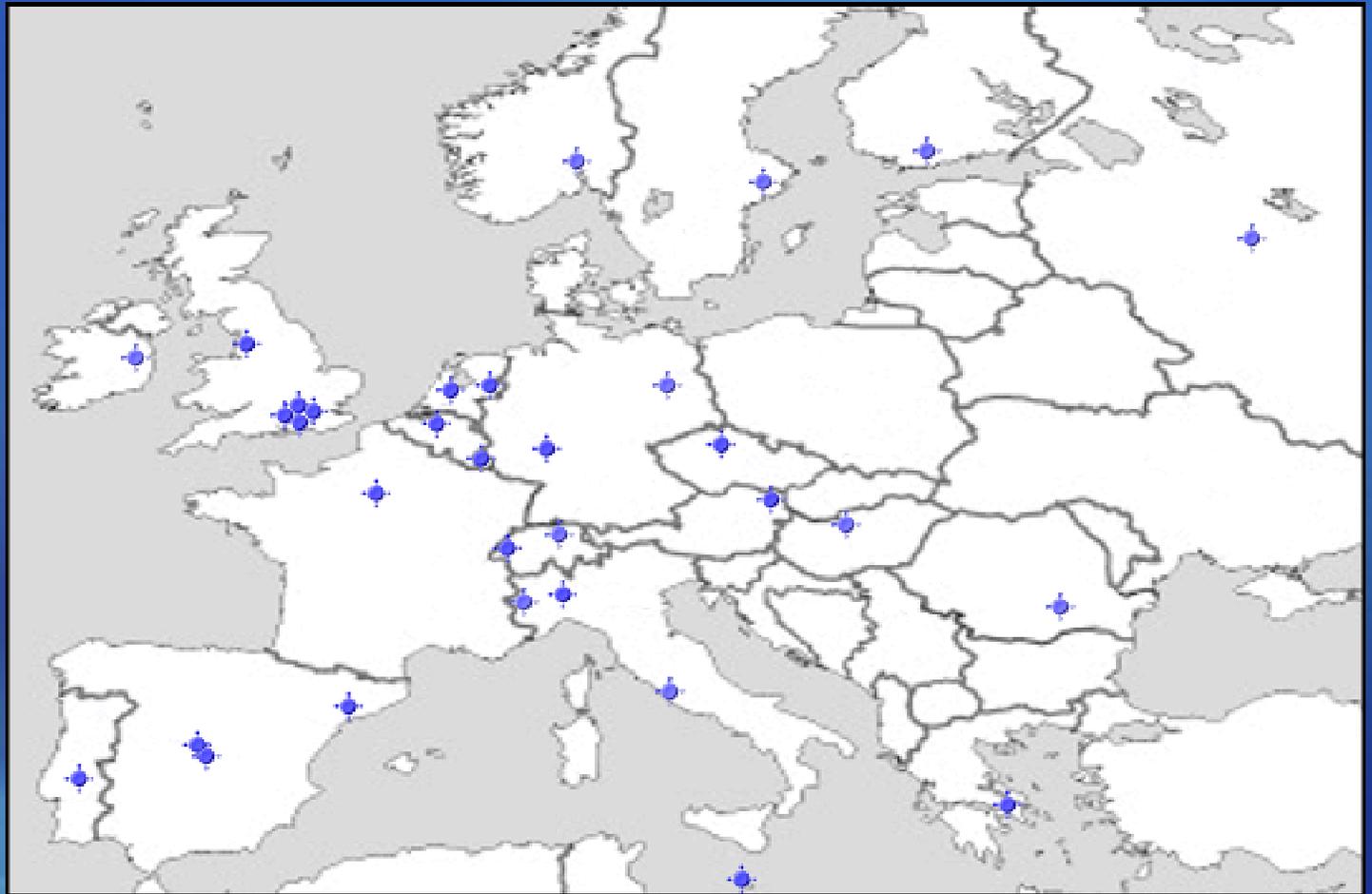
Where can I peer in Europe?

- The IX Matrix provides a listing and comparison of characteristics and services offered by member IX's

IXP	Location	ASN	No. of Cust-omers	Public traffic stats	Non-profit	No. of sites	Priv. Peer-ing	IPv6	Type of IPv6 LAN	IPv6 registry	Multi-cast	Out of band access	24X7 serv-ices	24X7 access	10M	100M	1G	10G
AMS-IX	Amsterdam, NL	1200	197	Yes	Yes	4	Yes	Yes	main LAN	RIPE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
XchangePoint	London, UK; Frankfurt and Hamburg, DE	16260	165	Yes	No	11	Yes	Yes	IPv6 vLAN	RIPE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
LINX	London, UK	5459	147	Yes	Yes	8	Yes	Yes	main LAN	RIPE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DE-CIX	Frankfurt am Main, Germany	6695	132	Yes	Yes	3	Yes	Yes	main LAN	RIPE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MSK-IX	Moscow Russia	8631	128	Yes	Yes	8	Yes	Yes	IPv6 vLAN	RIPE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
VIX	Vienna, Austria	1120	79	Yes	Yes	2	Yes	Yes	IPv6 vLAN	sub del from LIR	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NIX	Oslo Norway	224	58	Yes	Yes	2	No	Yes	main LAN	RIPE	No	No	Yes	Yes	No	Yes	Yes	No
MIX	Milan, Italy	16004	56	Yes	Yes	1	No	Yes	IPv6 vLAN	RIPE	No	Yes	Yes	Yes	Yes	Yes	Yes	No
LIPEX	London U.K.	21238	53	Yes	No	3	Yes	Yes	main LAN	sub del from LIR	No	Yes	Yes	Yes	Yes	Yes	Yes	No
TIX	Zurich, Switzerland	8235	53	Yes	No	1	Yes	Yes	NA	NA	No	No	Yes	Yes	Yes	Yes	Yes	No
BIX	Budapest, Hungary	5507	50	Yes	Yes	6	Yes	No	NA	NA	No	Yes	Yes	Yes	Yes	Yes	Yes	No
NIX.CZ	Prague, Czech Republic	6881	50	Yes	Yes	4	No	Yes	main LAN	RIPE	No	No	Yes	Yes	Yes	Yes	Yes	No
Netnod	Stokholm, Sweden	8674	48	Yes	Yes	4	No	Yes	main LAN	RIPE	Yes	No	No	No	No	No	Yes	No
BNIX	Brussels, Belgium	5406	45	Yes	Yes	3	Yes	Yes	main LAN	RIPE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

With whom can I peer?

- The Euro-IX ASN database currently lists over 1.600 customers that are connected to the member IX's
- Almost 1.000 of these customers have unique ASNs
- Database can be searched by Org, ASN or IX

Organisation	ASN	IXP	Updated
IP Exchange GmbH	15598	AMS-IX	20th May 2004
100 Percent IT	20915	XchangePoint	
100 Percent IT	20915	LIPEX	
1A Networks	12621	LIPEX	
1A Networks	12621	LoNAP	20th Dec 2003
1A Networks Ltd	12621	XchangePoint	30th Mar 2004
1A Networks Ltd	12621	LINX	8th Jun 2004
22 Host	29138	XchangePoint	4th Feb 2004
2COM Co	8334	MSK-IX	26th May 2003
2fast Internet Services	21392	AMS-IX	3rd Jun 2003
4-U-Networks Limited	25369	XchangePoint	29th Mar 2004
49pence	29131	XchangePoint	4th Feb 2004
@HOME Benelux B.V.	9143	AMS-IX	3rd Jun 2003
A.Systems Internet	12820	MSK-IX	5th Dec 2002
ABC-Europe Ltd	8457	XchangePoint	27th Oct 2003
ABCnet Internet Services	8457	LIPEX	
ABCnet Internet Services	8457	XchangePoint	30th Mar 2004
AboveNet	6461	VIX	
AboveNet	6461	XchangePoint	29th Mar 2004
Abovenet	6461	LINX	8th Jun 2004
AboveNet Deutschland GmbH	6461	DE-CIX	8th Jun 2004
AboveNet MFN	6461	AMS-IX	3rd Jun 2003
Access 11 Ltd	8757	XchangePoint	29th Mar 2004
accom GmbH & Co. KG	9189	DE-CIX	8th Jun 2004
Acens	16371	CATNIX	17th Oct 2003
ACOnet/AT	1853	VIX	
Adam	15699	CATNIX	17th Oct 2003

With whom can I peer?

- The Euro-IX 'IX Peering Matrix' is a cross reference of the number of unique/non-unique ASNs connected at each Euro-IX member IX

IXP	Total listed ASNs at IXP	ASNs that don't peer at other IXPs	% of ASNs that don't peer at other IXPs	ASNs that peer at other IXPs	% of ASNs that peer at other IXPs	AIX	AMS-IX	BCIX	BIX	BNIX	CATNIX	CIXP	DE-CIX	ESPANIX	GIGAPIX	INEX	LINX	LIPEX	LIX	LoNAP	MAD-IX	MaNAP	MIX
AIX	15	14	93%	1	7%	15	1	0	1	1	0	1	1	1	1	1	1	0	0	0	0	0	1
AMS-IX	197	93	47%	104	53%	1	195	1	3	26	3	9	63	9	3	5	72	7	0	10	3	6	14
BCIX	15	11	73%	4	27%	0	1	15	0	1	1	0	4	1	0	0	2	0	0	0	0	0	0
BIX	49	45	92%	4	8%	1	3	0	48	1	0	1	3	1	1	1	2	0	0	0	0	0	2
BNIX	45	16	36%	29	64%	1	26	1	1	45	2	3	15	5	2	2	19	1	3	0	2	0	6
CATNIX	19	9	47%	10	53%	0	3	1	0	2	19	0	2	10	1	1	4	0	0	0	0	0	1
CIXP	28	13	46%	15	54%	1	9	0	1	3	0	28	4	2	1	2	7	0	0	1	0	0	3
DE-CIX	132	50	38%	82	62%	1	63	4	3	15	2	4	132	8	3	4	59	2	1	6	4	4	14
ESPANIX	28	9	32%	19	68%	1	9	1	1	5	10	2	8	28	2	2	11	0	0	0	2	0	4
GIGAPIX	20	16	80%	4	20%	1	3	0	1	2	1	1	3	2	20	2	3	0	0	0	0	0	2
INEX	9	3	33%	6	67%	1	5	0	1	2	1	2	4	2	2	9	6	0	0	0	0	1	2
LINX	146	32	22%	114	78%	1	72	2	2	19	4	7	59	11	3	6	146	21	0	15	4	15	14
LIPEX	53	5	9%	48	91%	0	7	0	0	1	0	0	2	0	0	0	21	53	0	19	1	11	0
LIX	11	8	73%	3	27%	0	0	0	0	3	0	0	1	0	0	0	0	0	11	0	0	0	0
LoNAP	40	8	20%	32	80%	0	10	0	0	0	0	1	6	0	0	0	15	19	0	40	0	7	0
MAD-IX	5	1	20%	4	80%	0	3	0	0	2	0	0	4	2	0	0	4	1	0	0	5	0	2
MaNAP	27	6	22%	21	78%	0	6	0	0	0	0	0	4	0	0	1	15	11	0	7	0	27	1
MIX	56	32	57%	24	43%	1	14	0	2	6	1	3	14	4	2	2	14	0	0	0	2	1	56

How do I make Contact?

- All member IX's have contact details and further information listed on the Euro-IX website
- A 'Contact form' is also available if one would like to make contact with more than one member IX

MSK IX

IXP	MSK-IX
Full IXP Name	Moscow Internet Exchange
Location	Moscow Russia
Established in	1995
Number of customers	128
Public traffic statistics	www.msk-ix.ru/rus/tech/stat.shtml
Cost of switch connection	Starting from 200$/month
One time fee	500$
Housing costs	
Further cost details	http://www.msk-ix.ru/rus/docs/prices.shtml
Joining Requirements	http://www.msk-ix.ru/eng/tech/
Characteristics	Independent Non-profit Neutral Point of Presence in 8 buildings in Moscow
Telephone:	+7 095 196 7278
URL	http://www.msk-ix.ru/eng
E-mail	msk-ix-adm@ripn.net
Application Form	http://www.msk-ix.ru/rus/docs/contract.shtml
or fill in the	IXP contact form

Euro-IX website

- All of the information and tools that I have mentioned can be found on the Euro-IX website at:

http://www.euro-ix.net/isp/

Questions?

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