



European Internet Exchange Association

2009 Report on European IXPs

Serge Radovic of Euro-IX

23 October 2009

<http://www.euro-ix.net>

CONTENTS

1. Introduction

- 1.1 Foreword
- 1.2 Internet Exchange Points
- 1.3 Euro-IX
- 1.4 List of Euro-IX Affiliates
- 1.5 Notes on this report
- 1.6 Executive summary and previous year comparisons

2. IXPs in Europe

- 2.1 IXPs listed per country
- 2.2 Number of IXPs per country
- 2.3 Total Number of IXPs per European city

3. IXP growth since 1992

- 3.1 IXP growth in Europe since 1992
- 3.2 Additional and total IXP growth per year

4. IXP peak traffic

- 4.1 Aggregated peak traffic per country
- 4.2 Annual growth of aggregated peak traffic per country
- 4.3 IXP traffic per country
- 4.4 Peak aggregated IXP traffic per city
- 4.5 IXP traffic per city (A - M)
- 4.6 IXP traffic per city (M - Z)
- 4.7 Annual IXP traffic growth per city
- 4.8 Percentage of IXPs and their peak traffic
- 4.9 IXP traffic per million inhabitants (graphical)
- 4.10 IXP traffic per million Internet users
- 4.11 IXP traffic per million inhabitants and Internet users (tabular)

5. IXP participants

- 5.1 Total number of IXP participants per country (graphical)
- 5.2 Total number of IXP participants per country (tabular)
- 5.3 Percentage of IXPs and their number of participants
- 5.4 Average peak traffic per IXP participant per country (graphical)
- 5.5 Average peak traffic per IXP participant per country (tabular)
- 5.6 Number of ASNs present at more than one IXP in Europe
- 5.7 ASNs present at more than one IXP in Europe

6. European IXP aggregated peak traffic trends

- 6.1 Aggregated peak traffic history 2002-2009
- 6.2 European traffic growth over 12 months – August 2008 to August 2009
- 6.3 Summer traffic trend in Europe: 2006
- 6.4 Summer traffic trend in Europe: 2007
- 6.5 Summer traffic trend in Europe: 2008
- 6.6 Summer traffic trend in Europe: 2009
- 6.7 Categorised and regional IXP annual growth rate comparison
- 6.8 Regional monthly growth rates
- 6.9 Categorised monthly growth rates
- 6.10 Global annual IXP growth rate comparison
- 6.11 Global monthly IXP growth rates

7. IXP switching platform technology

- 7.1 Percentage of the European IXP market share for switch vendors
- 7.2 Number of switches in use at European IXPs
- 7.3 European IXPs and their choice of switch vendor
- 7.4 Amount of IXP traffic passing over a particular switch brand (in Gbps)
- 7.5 Amount of peak IXP traffic per switch (in Gbps)
- 7.6 Aggregated IXP traffic share of a particular switch brand
- 7.7 Amount of peak IXP traffic passing over a particular brand of switch

8. Further information

- 8.1 Resources
- 8.2 About the author
- 8.3 Contact

Section 1. Introduction

1.1 Foreword

This report has been compiled by the European Internet Exchange Association (Euro-IX) in an attempt to get a better picture of the past and current situation in regards to the number of Internet Exchange Points (IXPs) operating in Europe, the amount of traffic being exchanged at these IXPs, the number of connected parties peering there, and other relevant statistics and trends that are now appearing in the European IXP market.

1.2 Internet Exchange Point (IXP)

Euro-IX has accepted the industry definition of an IXP as being:

“A physical network infrastructure operated by a single entity with the purpose to facilitate the exchange of Internet traffic between Autonomous Systems. The number of Autonomous Systems connected should at least be three and there must be a clear and open policy for others to join.”

1.3 Euro-IX

The European Internet Exchange Association (Euro-IX) was formed in May 2001 with the intention to further develop, strengthen and improve the Internet Exchange Point (IXP) community.

A number of Internet Exchange Points recognised a need to combine their resources so as to coordinate technical standards across the continent, develop common procedures, and share and publish statistics and other information. This publishing of information would in turn give all interested parties a better insight into the world of IXPs.

Euro-IX was originally set-up as a discussion forum for European based IXPs however as interest started to grow from other regions it seemed a natural progression for Euro-IX to expand beyond its original boundaries. Thus in January of 2005 the association decided to open its doors to IXPs from outside of Europe and this saw the introduction of allowing non-European based associate member IXPs to join Euro-IX.

Today Euro-IX has 38 member IXPs from some 25 European countries, as well as 10 associate member IXPs from Iceland, Egypt, Japan, India, Nepal and the United States and 8 patrons from the switch vendor and the collocation sectors of our community. The complete Euro-IX affiliated list is presented below [see *1.4 List of Euro-IX affiliates*]

1.4 List of Euro-IX affiliates

1.4.1 Euro-IX Member IXPs (Europe)

AIX	Athens	Greece
AMS-IX	Amsterdam	Netherlands
BCIX	Berlin	Germany
BIX	Budapest	Hungary
BNIX	Brussels	Belgium
CATNIX	Barcelona	Spain
CIX	Zagreb	Croatia
CIXP	Geneva	Switzerland
DE-CIX	Frankfurt	Germany
Equinix	Zurich	Switzerland
ESPANIX	Madrid	Spain
FICIX	3 locations	Finland
FVG-IX	Udine	Italy
GigaPIX	Lisbon	Portugal
GN-IX	Groningen	Netherlands
INEX	Dublin	Ireland
InterLAN	Bucharest	Romania
LINX	London	United Kingdom
LIX	Luxembourg	Luxembourg
LONAP	London	United Kingdom
Lyonix	Lyon	France
LU-CIX	Luxembourg	Luxembourg
MIX	Milan	Italy
MSK-IX	Moscow	Russia
NaMeX	Rome	Italy
Netnod	Stockholm	Sweden
NIX	5 locations	Norway
NIX.CZ	Prague	Czech Republic
NL-ix	Amsterdam	The Netherlands
PacketExchange	26 Locations	Europe and United States
PLIX	Warsaw	Poland
RoNIX	Bucharest	Romania
SIX	Ljubljana	Slovenia
SwissIX	Zurich	Switzerland

1.4.1 Euro-IX Member IXPs (Europe) - Continued

TIX-Tuscany	Florence	Italy
TOP-IX	16 locations	Northwest Italy
VIX	Vienna	Austria
VSIX	Padova	Italy

1.4.2 Euro-IX Associate Member IXPs (outside of the Euro-IX region)

Any2 Exchange	United States
BBIX	Japan
JPIX	Japan
JPNAP	Japan
MEIX	Egypt
NOTA/Terremark	United States
NPIX	Nepal
Switch and Data	United States
RIX	Iceland

1.4.3 Euro-IX Patrons

Cisco Systems
Extreme Networks
Force10 Networks
Foundry Networks
Glimmerglass
Juniper Networks
Interxion
TelecityGroup

1.5 Notes on this report

- i. *The aggregated peak traffic statistics of the IXPs have been based on the publicly available web statistics that were gathered on the 27th of August 2009. These traffic figures do not take into account Privately Interconnected (PI) participants whose traffic does not pass over the IXP switching fabric.*
- ii. *Not all European IXPs publicly publish aggregated traffic statistics and no attempts at estimates were made where true figures were not presented.*
- iii. *All information has been gathered on a best effort basis and relies on the information that is publicly published by individual IXPs. Therefore all information contained in this report is only as accurate as the information that has been published by these IXPs. If you are planning to base your decision on the information contained in this report we strongly advise that check the information against up to date data.*
- iv. *The IXP traffic statistics are very dynamic and keep changing on a daily basis. While the actual traffic amounts may be outdated, it is nonetheless quite an accurate representation of the ranking of each IXP, city or country in relation to one another. Latest captured traffic rankings will be provided upon request.*
- v. *While the scope of this report does not attempt to analyse each graph in any great depth, further information can be requested for specific sections.*
- vi. *A best effort was made to list all known IXPs in Europe, however it is expected that a very small number of IXPs may have been left out of this report. Euro-IX would welcome any information about IXPs that have not been covered in this report.*
- vii. *Certain IXPs that were listed in the 2008 report have not been included in the 2009 report due to the fact that either no contact can be made with them to verify if they are still operational, or they have no working website or we have received information that they are no longer operational. These IXPs are: EuroGIX, MAE – Frankfurt, MAE – Paris and MA-IX.*
- viii. *In 2009 we have made a substantial effort to get in contact with a larger percentage of the European IXP community so that we were able to provide more accurate information in this report. Euro-IX was in contact with 107 of the 121 listed IXPs. This increase in contact has allowed us to provide much more accurate trends on traffic statistics as well as better details of IXP establishment dates, participants and the switches that are being used at IXPs across Europe.*

1.6 Executive summary and previous year comparisons

This table attempts to capture the main numbers and figures from this and previous year's reports. It shows that IXPs are still being established at a modest rate. Those IXPs that already exist are increasing their number of sites at a healthy rate. Even though percentage wise the growth of aggregated peak traffic seems to be slowing down over the last four years it should be kept in mind that the actual traffic growth is increasing every year (almost 1Tbps in last 12 months August 2008 – August 2009). The total number of IXP participants is still growing at a rate of around 15% per annum and amount of unique ASNs peering at multiple IXPs is following suit. Finally the amount of switches that European IXPs are using has risen by almost 30% in the 12 months (2008 – 2009) and the average amount of peak traffic that passes over these switches is in the vicinity of 5.9 Gbps.

	2009	2008	2007	2006
Known operating IXPs	121	116	116	116
Number of cities with IXPs	115	102	96	92
Total IXP Sites	389	324	282	226
Number of countries with IXPs	33	31	31	31
Aggregated peak IXP traffic	2714.165	1765.78	1151.822	631.43
12 month IXP traffic growth	53.71%	53.30%	82.41%	93.76%
Gbps per Million people in Europe	3.943	2.583	1.695	1.000
Gbps per million users in Europe	7.464	n/a	n/a	n/a
Total IXP participants	5167	4466	3959	3401
Total published ASNs	4719	3987	3458	2970
Total unique published ASNs	2822	2340	2105	1965
Estimated total unique ASNs	3090	2621	2410	2249
Average traffic per IXP participant	437 Mbps	326 Mbps	295 Mbps	192 Mbps
Average traffic per unique ASN	571 Mbps	444 Mbps	547 Mbps	235 Mbps
ASNs peering at 2 or more IXPs	782	661	577	429
ASNs peering at 10 or more IXPs	29	18	17	12
Total number of switches at IXPs	564	434	372	266
Average Traffic load per switch	5.9 Gbps	5.1 Gbps	3.9 Gbps	2.4 Gbps

Section 2. IXPs in Europe

2.1 IXPs listed per country

The following pages list all *known active* IXPs in Europe. This totals some **121 IXPs in 115 different cities in 33 European countries.**

Austria (1)

VIX	Vienna Internet eXchange	Vienna
-----	--------------------------	--------

Belgium (2)

BNIX	Belgian National Internet Exchange	Brussels
FreeBIX	FreeBIX	Brussels

Bulgaria (1)

B-IX	Balkan Internet Exchange	Sofia
------	--------------------------	-------

Croatia (1)

CIX	Croatian Internet eXchange	Zagreb
-----	----------------------------	--------

Cyprus (1)

CyIX	Cyprus Internet Exchange	Nicosia
------	--------------------------	---------

Czech Republic (2)

CBIX	Commercial Brno Internet Exchange	Brno
NIX.CZ	Neutral Internet eXchange of the Czech Republic	Prague

Denmark (1)

DIX	Danish Internet eXchange point	Lyngby
-----	--------------------------------	--------

Estonia (2)

TIX	Tallinn Internet eXchange	Tallinn
TLLIX	Tallinn Internet Exchange	Tallinn

Finland (4)

FICIX 1	Finnish Communication and Internet Exchange	Espoo
FICIX 2	Finnish Communication and Internet Exchange	Helsinki
FICIX 3	Finnish Communication and Internet Exchange	Oulu
TREX	Tampere Region Exchange	Tampere

France (9)

Equinix	Equinix	Paris
FNIX6	French National Internet Exchange IPv6	Paris
FreeIX	Free Internet Exchange	Paris
GEIX	Gigabit European Internet eXchange	Paris
Lyonix	Lyonix	Lyon
PaNAP	Paris Network Access Point	Paris
PARIX	Paris Internet Exchange	Paris
POUIX	POUIX	Paris
SFINX	Service for French INternet eXchange	Paris

Germany (12)

ALP-IX	Alpen Internet Exchange	Munich
BCIX	Berlin Commercial Internet Exchange	Berlin
DE-CIX	Deutscher Commercial Internet Exchange	Frankfurt
ECIX - Berlin	European Commercial Internet Exchange	Berlin
ECIX - Dusseldorf	European Commercial Internet Exchange	Dusseldorf
ECIX - Hamburg	European Commercial Internet Exchange	Hamburg
INXS	Internet Exchange Point in Munich	Munich
KleyRex	Kleyer Rebstocker EXchange	Frankfurt
NDIX	Nederlands-Duitse Internet Exchange	Munster & Dusseldorf
N-IX	Nurnberger Internet eXchange	Nurnberg
S-IX	Stuttgarter internet eXchange	Stuttgart
WORK-IX	WORK-IX	Hamburg

Greece (2)

AIX	Athens Internet Exchange	Athens
GR-IX	Greek Internet Exchange	Athens

Hungary (1)

BIX	Budapest Internet eXchange	Budapest
-----	----------------------------	----------

Iceland (1)

RIX	Reykjavik Internet Exchange	Reykjavik
-----	-----------------------------	-----------

Ireland (3)

CNIX	Cork Neutral Internet Exchange	Cork
ExWest	eXchange West	Galway
INEX	Internet Neutral EXchange	Dublin

Italy (7)

FVG-IX	Friuli Venezia Giulia Internet eXchange	Udine
MINAP	Milan Neutral Access Point	Milan
MIX	Milan Internet eXchange	Milan
NaMeX	Nautilus Mediterranean Exchange Point	Rome
TIX Tuscany	Tuscany Internet eXchange	Florence
TOP-IX	Torino Piemonte Exchange Point	Torino
VSIX	VSIX Nap del Nord Est	Padova

Kazakhstan (1)

KAZ-IX	Kazakhstan Traffic Exchange	Almaty
--------	-----------------------------	--------

Latvia (1)

LIX	Latvian Internet eXchange	Riga
-----	---------------------------	------

Luxembourg (2)

LIX	Luxembourg Internet eXchange	Luxembourg
LU-CIX	Luxembourg Commercial Internet Exchange	Luxembourg

Malta (1)

MIX	Malta internet Exchange	Msida
-----	-------------------------	-------

Netherlands (6)

AMS-IX	Amsterdam Internet Exchange	Amsterdam
FR-IX	Friese Internet Exchange	Leeuwarden
GN-IX	Groningen Internet Exchange	Groningen
NDIX	Nederlands-Duitse Internet Exchange	Enschede
NL-IX	Netherlands Internet Exchange	Amsterdam
R-iX	Rotterdam Internet Exchange	Rotterdam

Norway (7)

BIX	Bergen Internet Exchange	Bergen
FIXO	Free Internet eXchange Oslo	Oslo
NIX1	Norwegian Internet eXchange	Oslo
NIX2	Norwegian Internet eXchange	Oslo
SIX	Stavanger Internet Exchange	Stavanger
TIX	Tromsø Internet Exchange	Tromsø
TRDIX	Trondheim Internet Exchange	Trondheim

Poland (4)

LIX	Lodz Internet Exchange	Lodz
PIX	Poznan Internet Exchange	Poznan
PLIX	Polish Internet Exchange	Warsaw
WIX	Warsaw Internet eXchange	Warsaw

Portugal (1)

GIGAPIX	GIGAbit Portuguese Internet eXchange	Lisbon
---------	--------------------------------------	--------

Romania (2)

InterLAN	InterLAN IX	Bucharest
RoNIX	Romanian Network for Internet eXchange	Bucharest

Russia (13)

CHEL-PP	Chelyabinsk Peering Point	Chelyabinsk
EKT-IX	Ekaterinburg Internet Exchange	Ekaterinburg
IX-NN	IX of Nizhny Novgorod	Nizhny Novgorod
KRS-IX	Krasnoyarsk Internet Exchange	Krasnoyarsk
MSK-IX	Moscow Internet Exchange	Moscow
NSK-IX	Novosibirsk Internet eXchange	Novosibirsk
PERM-IX	Perm Internet Exchange	Perm
RND-IX	Rostov on Don Internet Exchange	Rostov on Don
SMR-IX	SAMARA-IX	Samara
SPB-IX	St.-Petersburg Internet eXchange	St.-Petersburg
ULN-IX	Ulyanovsk Internet Exchange	Ulyanovsk
Ural-IX	Ural-IX	Ekaterinburg
VLV-IX	Vladivostok Internet Exchange	Vladivostok

Slovakia (3)

SIX	Slovak Internet eXchange- Bratislava	Bratislava
SIX	Slovak Internet eXchange- Kosice	Kosice
sitelix	Sitel Internet eXchange	Bratislava

Slovenia (1)

SIX	Slovenian Internet Exchange	Ljubljana
-----	-----------------------------	-----------

Spain (3)

CATNIX	Catalunya Neutral Internet Exchange	Barcelona
ESPANIX	Espana Internet Exchange	Madrid
EuskoNIX	Punto neutro Vasco de Internet	Bilboa

Sweden (11)

GIX	Gothenburg Internet Exchange	Gothenburg
MALMIX	Malmoe Internet Exchange	Malmoe
Netnod	Internet Exchange i Sverige	Stockholm
Netnod	Netnod - Gothenburg	Gothenburg
Netnod	Netnod - Lulea	Lulea
Netnod	Netnod - Malmoe	Malmoe
Netnod	Netnod - Sundsvall	Sundsvall
NorrNod	NorrNod	Umea
RIX-GH	Regional Internet Exchange Gästrikland-Hälsingland	Gavle
STHIX	Stockholm Internet Exchange	Stockholm
SOLIX	SOLIX	Stockholm

Switzerland (3)

CIXP	CERN Internet eXchange Point	Geneva
Equinix	Equinix	Zurich
SwissIX	Swiss Internet Exchange	Zurich

Ukraine (5)

Crimea-IX	Crimea-IX	Simferopol
DTEL-IX	Digital Telecom Internet Exchange	Kiev
Od-IX	Odessa Internet Exchange	Odessa
KH-IX	Kharkov Internet Exchange	Kharkov
UA-IX	Ukrainian Internet Exchange	Kiev

United Kingdom (8)

LINX	London Internet Exchange	London
LIPEX	London Internet Providers EXchange	London
LONAP	London Network Access Point	London
MaNAP	Manchester Network Access Point	Manchester
MCIX	Manchester Commercial Internet Exchange	Manchester
MerieX	Meridian Gate Internet Exchange	London
PacketExchange	PacketExchange	London
RBEIX	RBEIX	London

2.2 Number of IXPs per country

This table lists the total number of IXPs that are known to exist in each European country. Where an IXP has multiple connected locations in more than one city within a country, this IXP has only been counted once for that particular country.

Country	No. of IXPs
Russia	13
Germany	12
Sweden	11
France	9
United Kingdom	8
Norway	7
Italy	7
Netherlands	6
Ukraine	5
Finland	4
Poland	4
Ireland	3
Slovakia	3
Spain	3
Switzerland	3
Belgium	2
Czech Republic	2
Estonia	2
Greece	2
Luxembourg	2
Romania	2
Austria	1
Bulgaria	1
Croatia	1
Cyprus	1
Denmark	1
Hungary	1
Iceland	1
Kazakhstan	1
Latvia	1
Malta	1
Portugal	1
Slovenia	1
33 countries	121

2.3 Total Number of IXPs per European City

City	Country	No. IXP	City	Country	No. IXP	
Paris	France	8	Hengelo	Netherlands	1	
London	United Kingdom	6	Ivrea	Italy	1	
Oslo	Norway	3	Kharkov	Ukraine	1	
Stockholm	Sweden	3	Kosice	Slovakia	1	
Amsterdam	Netherlands	2	Krakow	Poland	1	
Athens	Greece	2	Krasnoyarsk	Russia	1	
Berlin	Germany	2	Leeuwarden	Netherlands	1	
Bratislava	Slovakia	2	Leipzig	Germany	1	
Brussels	Belgium	2	Lisbon	Portugal	1	
Bucharest	Romania	2	Ljubljana	Slovenia	1	
Dusseldorf	Germany	2	Lodz	Poland	1	
Edinburgh	United Kingdom	2	Lulea	Sweden	1	
Ekaterinburg	Russia	2	Lyngby	Denmark	1	
Frankfurt	Germany	2	Lyon	France	1	
Gothenburg	Sweden	2	Madrid	Spain	1	
Hamburg	Germany	2	Marseille	France	1	
Helsinki	Finland	2	Moscow	Russia	1	
Kiev	Ukraine	2	Msida	Malta	1	
Luxembourg	Luxembourg	2	Munster	Germany	1	
Malmoe	Sweden	2	Nicosia	Cyprus	1	
Manchester	United Kingdom	2	Nizhny Novgorod	Russia	1	
Milan	Italy	2	Nordhorn	Germany	1	
Munich	Germany	2	Novara	Italy	1	
Tallinn	Estonia	2	Novosibirsk	Russia	1	
Warsaw	Poland	2	Nurnberg	Germany	1	
Zurich	Switzerland	2	Odessa	Ukraine	1	
Alessandria	Italy	1	Oldenzaal	Netherlands	1	
Almaty	Kazakhstan	1	Oulu	Finland	1	
Almelo	Netherlands	1	Padova	Italy	1	
Aosta	Italy	1	Perm	Russia	1	
Arnhem	Netherlands	1	Pont St. Martin	Italy	1	
Asti	Italy	1	Poznan	Poland	1	
Barcelona	Spain	1	Prague	Czech Republic	1	
Bergen	Norway	1	Reykjavik	Iceland	1	
Biella	Italy	1	Riga	Latvia	1	
Bilboa	Spain	1	Rome	Italy	1	
Borghorst	Germany	1	Rostov on Don	Russia	1	
Brno	Czech Republic	1	Samara	Russia	1	
Budapest	Hungary	1	Simferopol	Ukraine	1	
Chelyabinsk	Russia	1	Sofia	Bulgaria	1	
Cork	Ireland	1	St.-Petersburg	Russia	1	
Cuneo	Italy	1	Stavanger	Norway	1	
Deventer	Netherlands	1	Steinfurt	Germany	1	
Doetinchem	Netherlands	1	Strasbourg	France	1	
Dublin	Ireland	1	Stuttgart	Germany	1	
Ede	Netherlands	1	Sundsvall	Sweden	1	
Emsdetten	Germany	1	Tampere	Finland	1	
Enschede	Netherlands	1	Torino	Italy	1	
Florence	Italy	1	Trondheim	Norway	1	
Galway	Ireland	1	Udine	Italy	1	
Galve	Sweden	1	Ulyanovsk	Russia	1	
Geneva	Switzerland	1	Umea	Sweden	1	
Greven	Germany	1	Verbania	Italy	1	
Gronau	Germany	1	Vercelli	Italy	1	
Groningen	Netherlands	1	Vienna	Austria	1	
Hardenburg	Netherlands	1	Vladivostok	Russia	1	
Harderwijk	Netherlands	1	Zagreb	Croatia	1	
			Cities	115	Countries	33

Section 3. European IXP growth since 1992

3.1 IXP growth in Europe since 1992

This table details the ‘official’ establishment dates of IXPs in Europe since 1992. In some cases the IXP may have been ‘unofficially’ established (i.e. actually operating without any legal entity being established) earlier than some of the dates used in this table, however this report has been based on official establishment dates only.

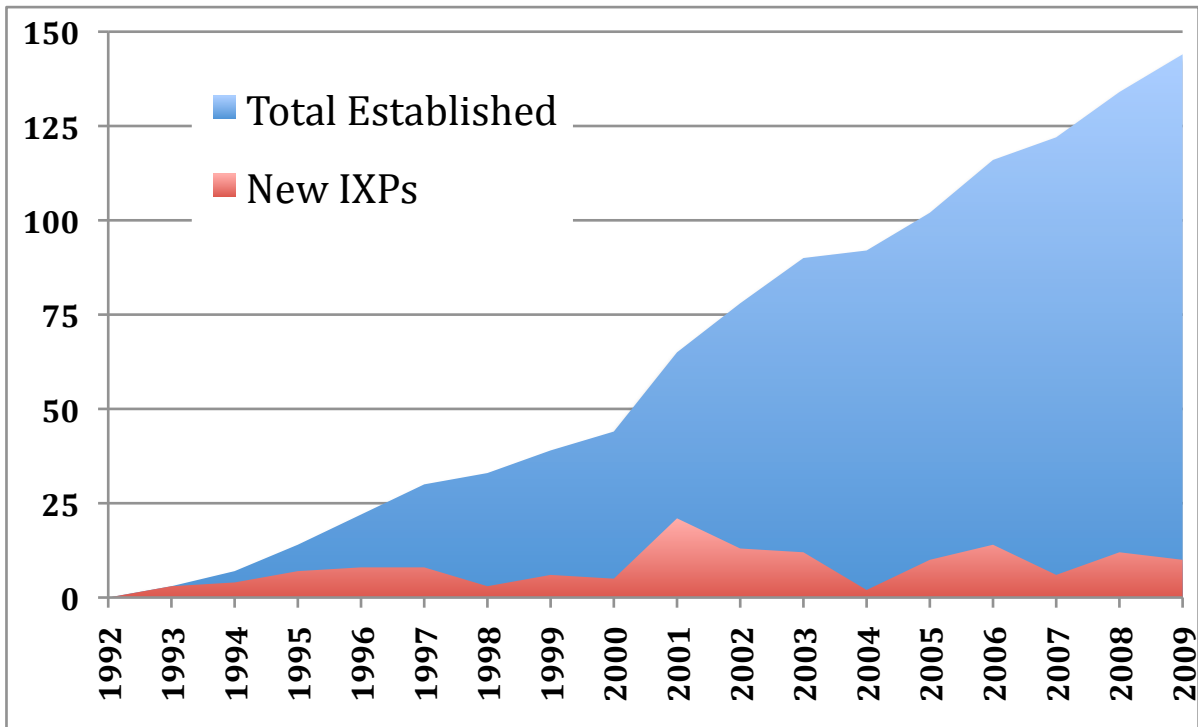
The three-year period between 2001 and 2003 saw the establishment of some 46 IXPs in Europe. While the growth of new IXPs had definitely slowed down since then, it is still evident that there is some growth in the IXP sector.

Year	New IXPs	% of tot established	Ceased to operate IXP	Known to be operational IXPs	Total established IXPs
1992	0	0%	0	0	0
1993	3	2%	0	3	3
1994	4	3%	0	7	7
1995	7	5%	0	14	14
1996	8	6%	0	22	22
1997	8	6%	0	30	30
1998	3	2%	0	33	33
1999	6	4%	0	39	39
2000	5	4%	0	44	44
2001	21	15%	0	65	65
2002	13	9%	0	78	78
2003	12	8%	0	90	90
2004	2	1%	0	92	92
2005	9	6%	0	101	101
2006	14	10%	0	115	115
2007	6	4%	6	115	121
2008	12	8%	12	115	133
2009	11	8%	5	121	144

Note: Euro-IX has been putting together such reports since 2006 thus it was not until 2007 that we were able to accurately recognize if IXPs had ceased to operate. The above table does not take into account the possibility of IXPs both being established and ceasing to operate before 2006.

3.2 Additional and total IXP growth per year

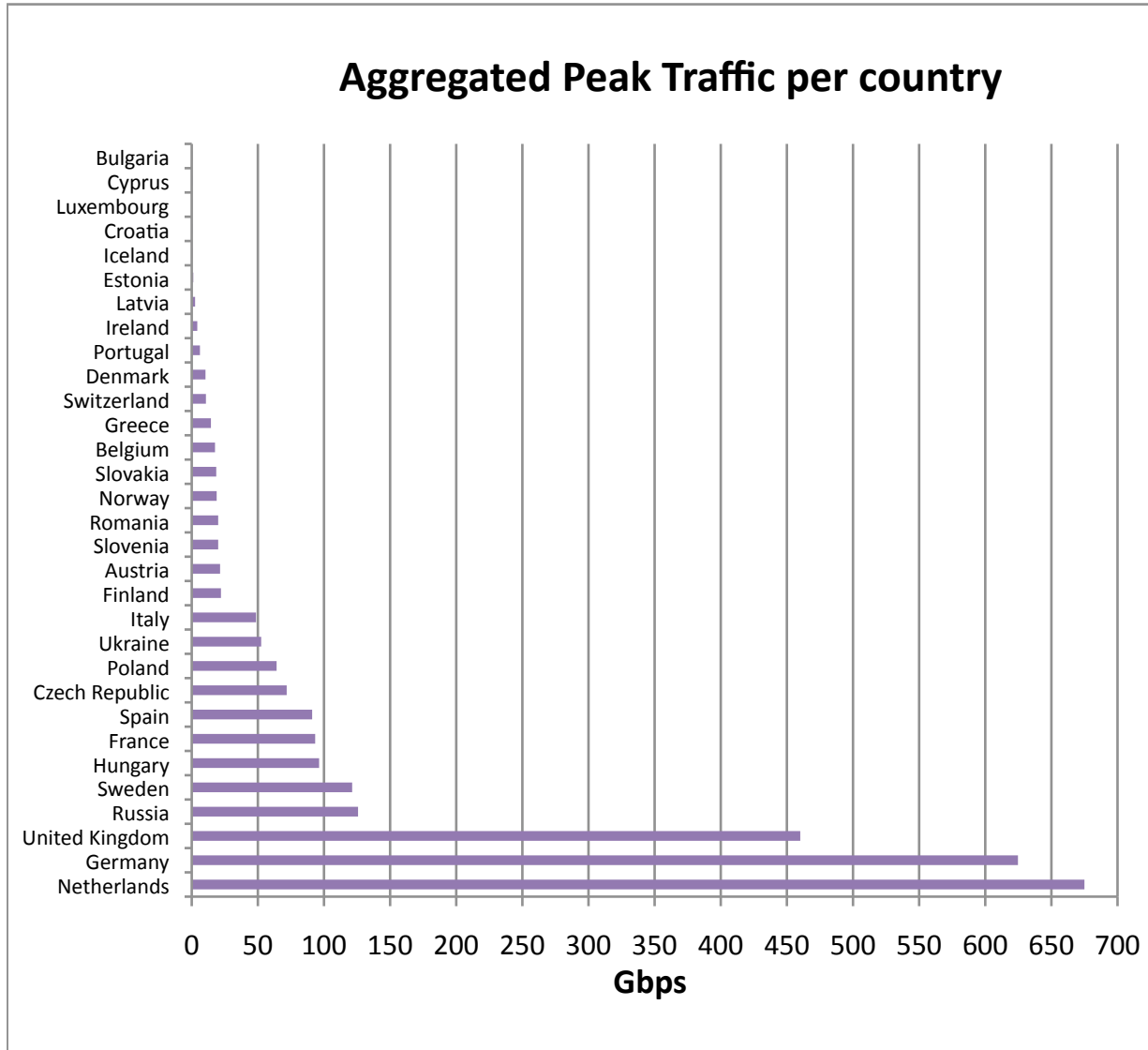
This graph highlights the establishment of new IXPs, per year, in comparison to the total amount of existing European IXPs. One can see from the graph that 2001, 2002 and 2003 were all years of exceptional growth in the establishment of IXPs in Europe. The last three years have seen the establishment of almost 30 IXPs that would suggest that the growth is still very much present.



Section 4. IXP peak traffic

4.1 Aggregated peak traffic per country

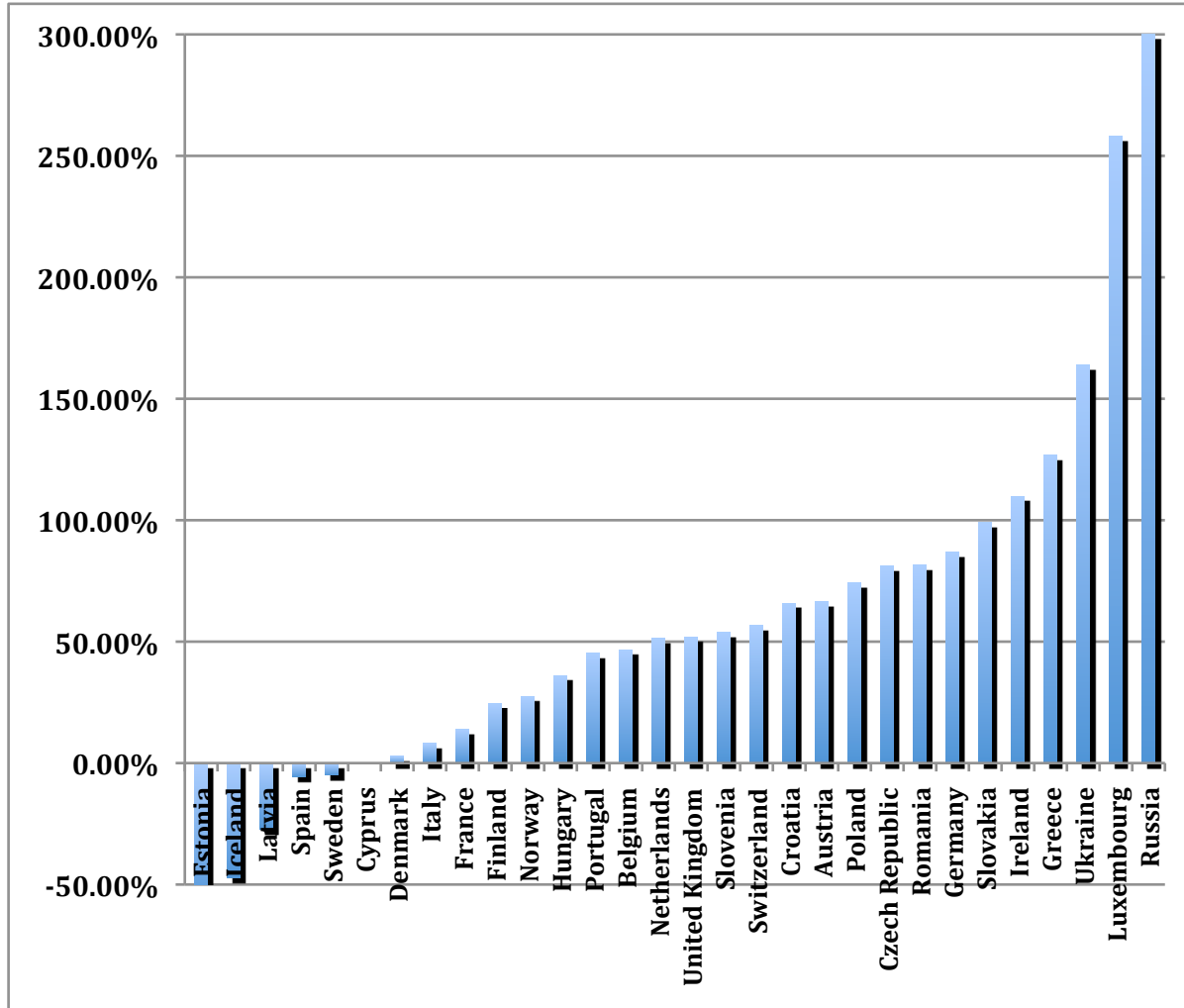
This graph outlines the total aggregated peak IXP traffic per country in Europe. The totals for each country have been reached by adding the various IXP's traffic together from any one particular country. It should be noted that this data is taken from publicly viewable traffic statistics and information that is provided to Euro-IX via IXPs directly. These statistics do not include Private Interconnect traffic that does not pass over the public peering infrastructure.



Note: This traffic data was captured on the 27th of August 2009

4.2 Annual growth of aggregated peak traffic per country

This graph shows the total aggregated peak IXP traffic per country growth rate from the 28th of August 2008 to the 27th of August 2009. The totals for each country have been reached by adding the various IXP's traffic together from any one particular country. It should be noted that this data is taken from publicly viewable traffic statistics and information that is provided to Euro-IX via IXPs directly. These statistics do not include Private Interconnect traffic that does not pass over the public peering infrastructure.



Note: This traffic data was captured on the 27th of August 2009 and compared to data from 28th of August 2008.

4.3 IXP traffic per country

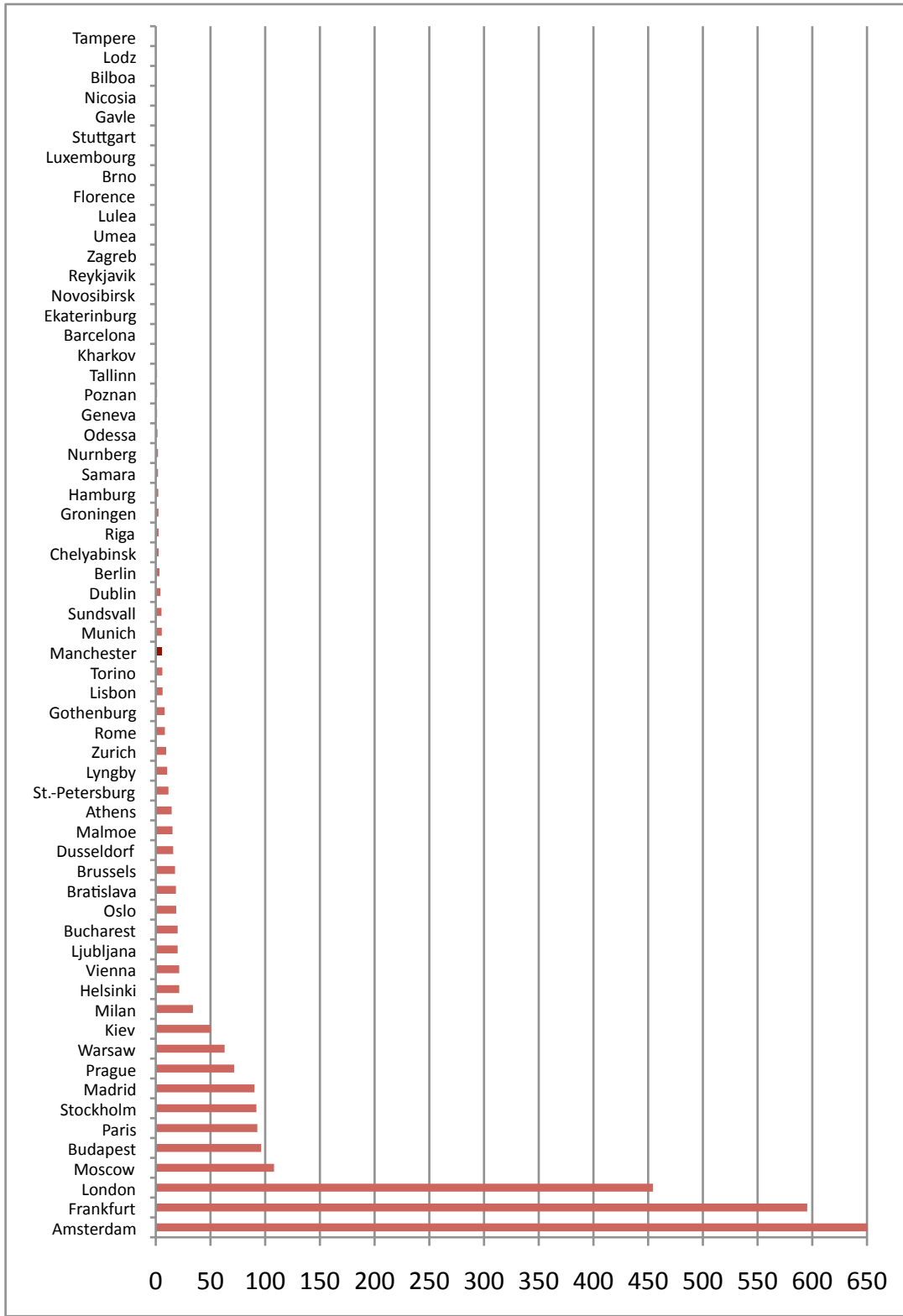
This table details the total aggregated peak IXP traffic per country in Europe. It further details the per country growth rate from the 28th of August 2008 to the 27th of August 2009. The totals for each country have been reached by adding the various IXPs' traffic together from any one particular country. It should be noted that this data is taken from publicly viewable traffic statistics and information that is provided to Euro-IX via IXPs directly. These statistics do not include Private Interconnect traffic that does not pass over the public peering infrastructure.

Country	Gbps 2009	% of total	Gbps 2008	Inc over 2008
Austria	21.430	0.78%	12.880	66.38%
Belgium	17.600	0.64%	12.000	46.67%
Bulgaria	0.100	0.00%	N/A	N/A
Croatia	0.345	0.01%	0.208	65.87%
Cyprus	0.100	0.00%	0.100	0.00%
Czech Republic	71.800	2.62%	39.620	81.22%
Denmark	10.400	0.38%	10.100	2.97%
Estonia	1.179	0.04%	3.060	-61.47%
Finland	22.093	0.81%	17.716	24.71%
France	93.340	3.41%	81.925	13.93%
Germany	624.720	22.80%	334.545	86.74%
Greece	14.516	0.53%	6.400	126.81%
Hungary	96.300	3.51%	70.800	36.02%
Iceland	0.508	0.02%	0.960	-47.08%
Ireland	4.198	0.15%	2.000	109.90%
Italy	48.602	1.77%	44.958	8.11%
Latvia	2.544	0.09%	3.500	-27.31%
Luxembourg	0.197	0.01%	0.055	258.18%
Netherlands	674.980	24.63%	445.580	51.48%
Norway	18.850	0.69%	14.800	27.36%
Poland	64.170	2.34%	36.830	74.23%
Portugal	6.213	0.23%	4.280	45.16%
Romania	19.993	0.73%	11.020	81.42%
Russia	125.753	4.59%	31.421	300.22%
Slovakia	18.528	0.68%	9.312	98.97%
Slovenia	20.000	0.73%	13.000	53.85%
Spain	91.053	3.32%	96.420	-5.57%
Sweden	121.297	4.43%	127.623	-4.96%
Switzerland	10.730	0.39%	6.850	56.64%
Ukraine	52.511	1.92%	19.892	163.98%
United Kingdom	460.115	16.79%	302.920	51.89%
Total	2,714.165		1,760.775	54.15%

Note: This traffic data was captured on the 27th of August 2009

4.4 Peak aggregated traffic per city

This graph illustrates the total aggregated peak IXP traffic per European city in Gbps.



Note: This traffic data was captured on the 27th of August 2009

4.5 IXP traffic per city (A - M)

This table details the total amount of aggregated peak IXP traffic per European city and shows what percentage the city's IXP traffic is compared to Europe's IXP traffic as a whole. It further details the per city growth rate from the 28th of August 2008 to the 27th of August 2009. In some cases there is more than one IXP present in a city, in these cases the total traffic of all those IXPs is shown.

City	Country	Traffic Gbps	% of total	2008 Traffic	Growth
Amsterdam	Netherlands	668.540	24.63%	440.910	51.63%
Athens	Grrece	14.516	0.53%	6.400	126.81%
Barcelona	Spain	0.793	0.03%	0.360	120.28%
Bergen	Norway	0.071	0.00%	n/a	n/a
Berlin	Germany	3.400	0.13%	2.700	25.93%
Bilboa	Spain	0.060	0.00%	0.060	0.00%
Bratislava	Slovakia	18.420	0.68%	9.312	97.81%
Brno	Czech Republic	0.200	0.01%	0.020	900.00%
Brussels	Belgium	17.600	0.65%	12.000	46.67%
Bucharest	Romania	19.993	0.74%	11.020	81.42%
Budapest	Hungary	96.300	3.55%	70.800	36.02%
Chelyabinsk	Russia	2.600	0.10%	0.010	25900.00%
Dublin	Ireland	4.197	0.15%	2.000	109.85%
Dusseldorf	Germany	15.920	0.59%	5.850	172.14%
Ekaterinburg	Russia	0.667	0.02%	0.150	344.67%
Florence	Italy	0.201	0.01%	0.214	-6.07%
Frankfurt	Germany	595.380	21.94%	317.805	87.34%
Galway	Ireland	0.001	0.00%	n/a	n/a
Gavle	Sweden	0.158	0.01%	0.379	-58.31%
Geneva	Switzerland	1.210	0.04%	1.250	-3.20%
Göteborg	Sweden	8.166	0.30%	11.436	-28.59%
Groningen	Netherlands	2.440	0.09%	2.670	-8.61%
Hamburg	Germany	2.300	0.08%	1.400	64.29%
Helsinki	Finland	21.435	0.79%	17.715	21.00%
Kharkov	Ukraine	0.800	0.03%	0.202	296.04%
Kiev	Ukraine	50.000	1.84%	19.370	158.13%
Kosice	Slovakia	0.108	0.00%	n/a	n/a
Lisbon	Portugal	6.213	0.23%	4.280	45.16%
Ljubljana	Slovenia	20.000	0.74%	13.000	53.85%
Lodz	Poland	0.050	0.00%	0.050	0.00%
London	United Kingdom	454.465	16.74%	302.620	50.18%
Lulea	Sweden	0.210	0.01%	0.219	-4.11%
Luxembourg	Luxembourg	0.197	0.01%	0.055	258.18%
Lyngby	Denmark	10.400	0.38%	10.100	2.97%
Lyon	France	0.550	0.02%	n/a	n/a
Madrid	Spain	90.200	3.32%	98.500	-8.43%
Malmö	Sweden	15.314	0.56%	20.702	-26.03%

Note: This traffic data was captured on the 27th of August 2009

4.6 IXP traffic per city (M - Z)

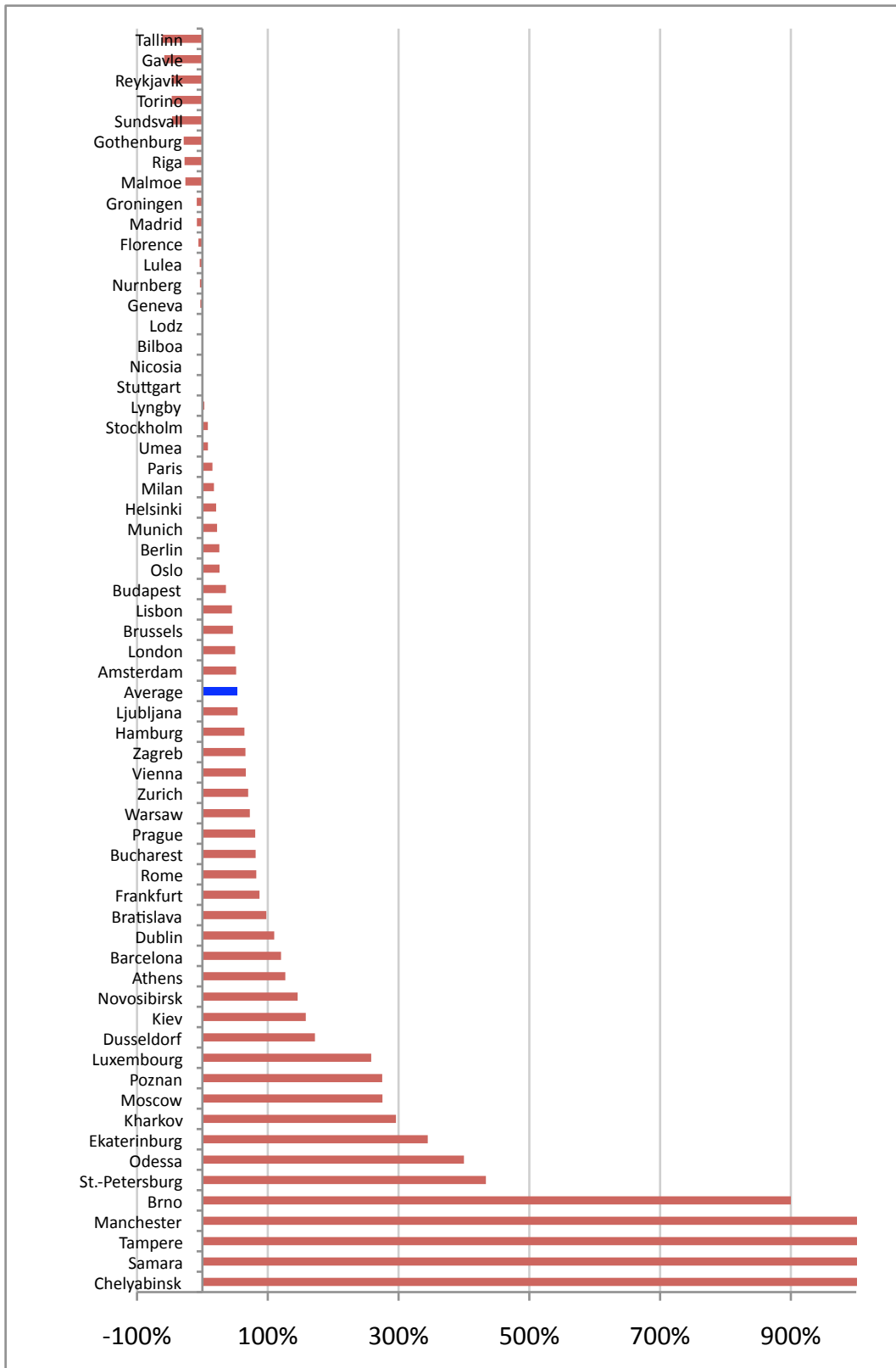
This table details the total amount of aggregated peak IXP traffic per European city and shows what percentage the city's IXP traffic is compared to Europe's IXP traffic as a whole. It further details the per city growth rate from the 28th of August 2008 to the 27th of August 2009. In some cases there is more than one IXP present in a city, in these cases the total traffic of all those IXPs is shown.

City	Country	Traffic Gbps	% of total	2008 Traffic	Growth
Manchester	United Kingdom	5.650	0.21%	0.300	1783.33%
Milan	Italy	33.971	1.25%	28.871	17.66%
Moscow	Russia	108.087	3.98%	28.796	275.35%
Munich	Germany	5.510	0.20%	4.500	22.44%
Nicosia	Cyprus	0.100	0.00%	0.100	0.00%
Novosibirsk	Russia	0.565	0.02%	0.230	145.65%
Nurnberg	Germany	2.040	0.08%	2.120	-3.77%
Odessa	Ukraine	1.600	0.06%	0.320	400.00%
Oslo	Norway	18.679	0.69%	14.800	26.21%
Oulu	Finland	0.638	0.02%	n/a	n/a
Padova	Italy	0.001	0.00%	n/a	n/a
Paris	France	92.790	3.42%	80.425	15.37%
Poznan	Poland	1.200	0.04%	0.320	275.00%
Prague	Czech Republic	71.600	2.64%	39.600	80.81%
Reykjavik	Iceland	0.508	0.02%	0.960	-47.08%
Riga	Latvia	2.544	0.09%	3.500	-27.31%
Rome	Italy	8.326	0.31%	4.564	82.43%
Rostov on Don	Russia	0.142	0.01%	n/a	n/a
Samara	Russia	2.045	0.08%	0.065	3046.15%
Simferopol	Ukraine	0.111	0.00%	n/a	n/a
Sofia	Bulgaria	0.100	0.00%	n/a	n/a
St.-Petersburg	Russia	11.579	0.43%	2.170	433.59%
Stockholm	Sweden	91.957	3.39%	84.864	8.36%
Stuttgart	Germany	0.170	0.01%	0.170	0.00%
Sundsvall	Sweden	5.249	0.19%	9.799	-46.43%
Tallinn	Estonia	1.179	0.04%	3.060	-61.47%
Tampere	Finland	0.020	0.00%	0.001	1900.00%
Torino	Italy	6.003	0.22%	11.309	-46.92%
Trondheim	Norway	0.100	0.00%	n/a	n/a
Udine	Italy	0.100	0.00%	n/a	n/a
Ulyanovsk	Russia	0.050	0.00%	n/a	n/a
Umea	Sweden	0.243	0.01%	0.224	8.48%
Vienna	Austria	21.430	0.79%	12.880	66.38%
Vladivostok	Russia	0.018	0.00%	n/a	n/a
Warsaw	Poland	62.920	2.32%	36.460	72.57%
Zagreb	Croatia	0.345	0.01%	0.208	65.87%
Zurich	Switzerland	9.520	0.35%	5.600	70.00%
Total		2714.165		1765.780	53.48%

Note: This traffic data was captured on the 27th of August 2009

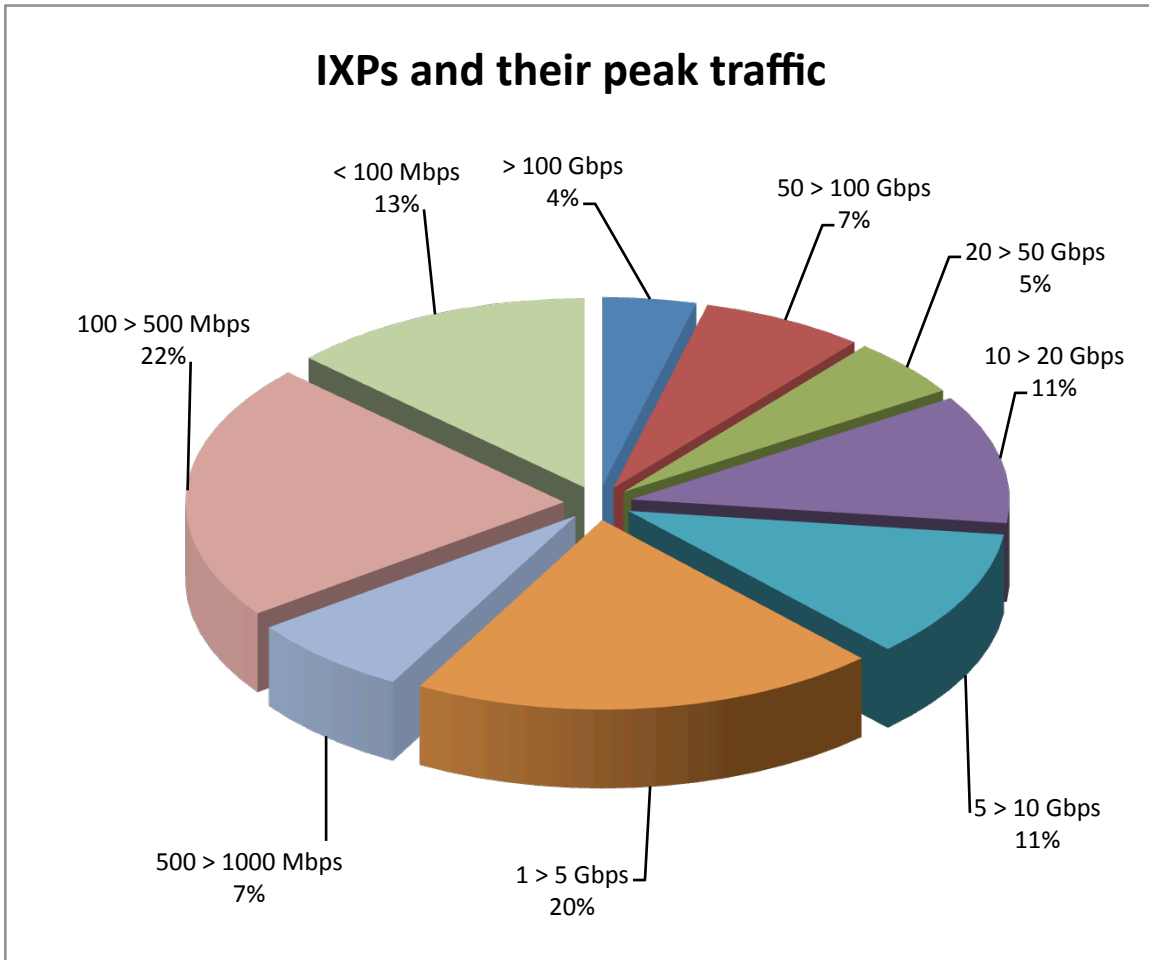
4.7 Annual IXP traffic growth per city

This graph details the growth rate of aggregated peak IXP traffic per European city from the 28th of August 2008 to the 27th of August 2009.



4.8 Percentage of IXPs and their peak traffic

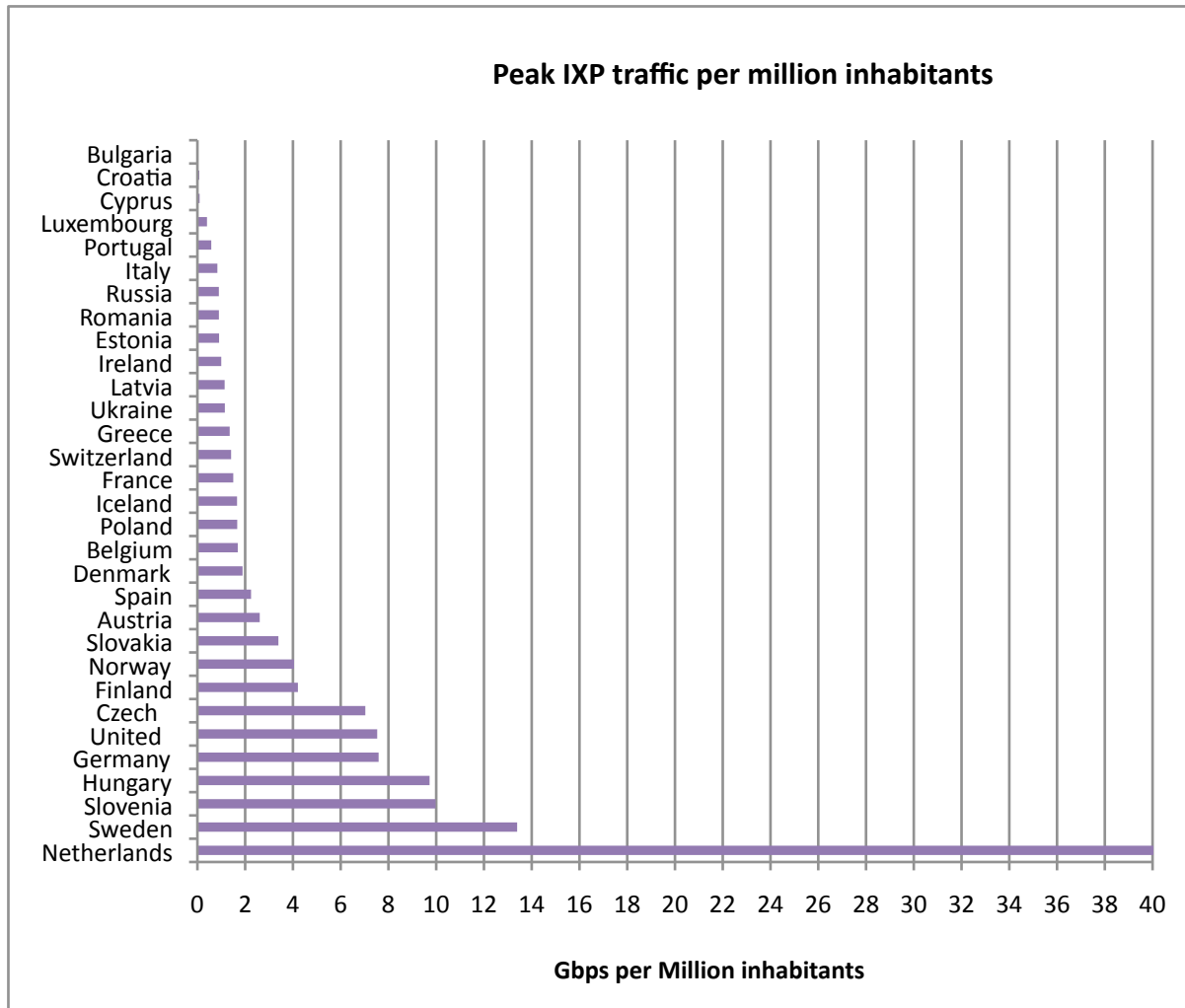
This graph highlights the percentage of European IXPs having a particular amount of peak traffic at their exchange. It should be noted that reliable traffic statistics could only be gathered from 100 of the 121 European IXPs, these percentages are therefore based on these 100 IXPs.



Peak traffic	# of IXPs	% of total
> 100 Gbps	4	4%
50 > 100 Gbps	7	7%
20 > 50 Gbps	5	5%
10 > 20 Gbps	11	11%
5 > 10 Gbps	11	11%
1 > 5 Gbps	20	20%
500 > 1000 Mbps	7	7%
100 > 500 Mbps	22	22%
< 100 Mbps	13	13%
Total	100	100%

4.9 IXP traffic per million inhabitants

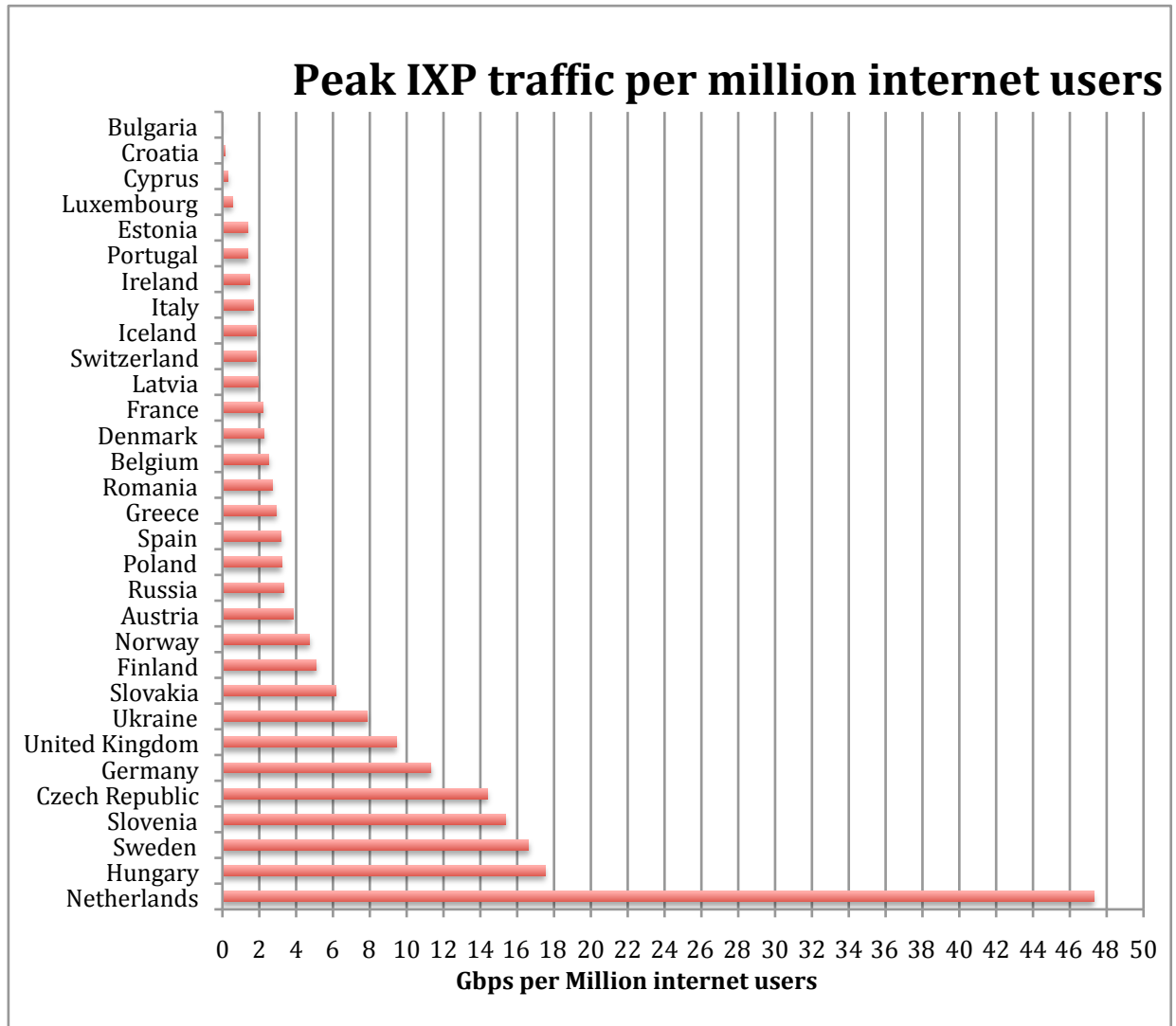
This graph displays the total amount of peak IXP traffic per country in Gbps per million inhabitants. The July 2009 population estimates were taken from the *CIA World Factbook*.



Note: This data was captured on the 27th of August 2009

4.10 IXP traffic per million Internet users

This graph displays the total amount of peak IXP traffic per country in Gbps per million Internet users in that same country. The August 2009 Internet user estimates were taken from www.internetworldstats.com



Note: This data was captured on the 27th of August 2009

4.11 IXP traffic per million inhabitants and Internet users

This table details the total amount of peak IXP traffic per country in Gbps per million inhabitants and per million Internet users in that same country. The July 2009 population estimates were taken from the *CIA World Factbook* the August 2009 Internet user estimates were taken from www.internetworldstats.com

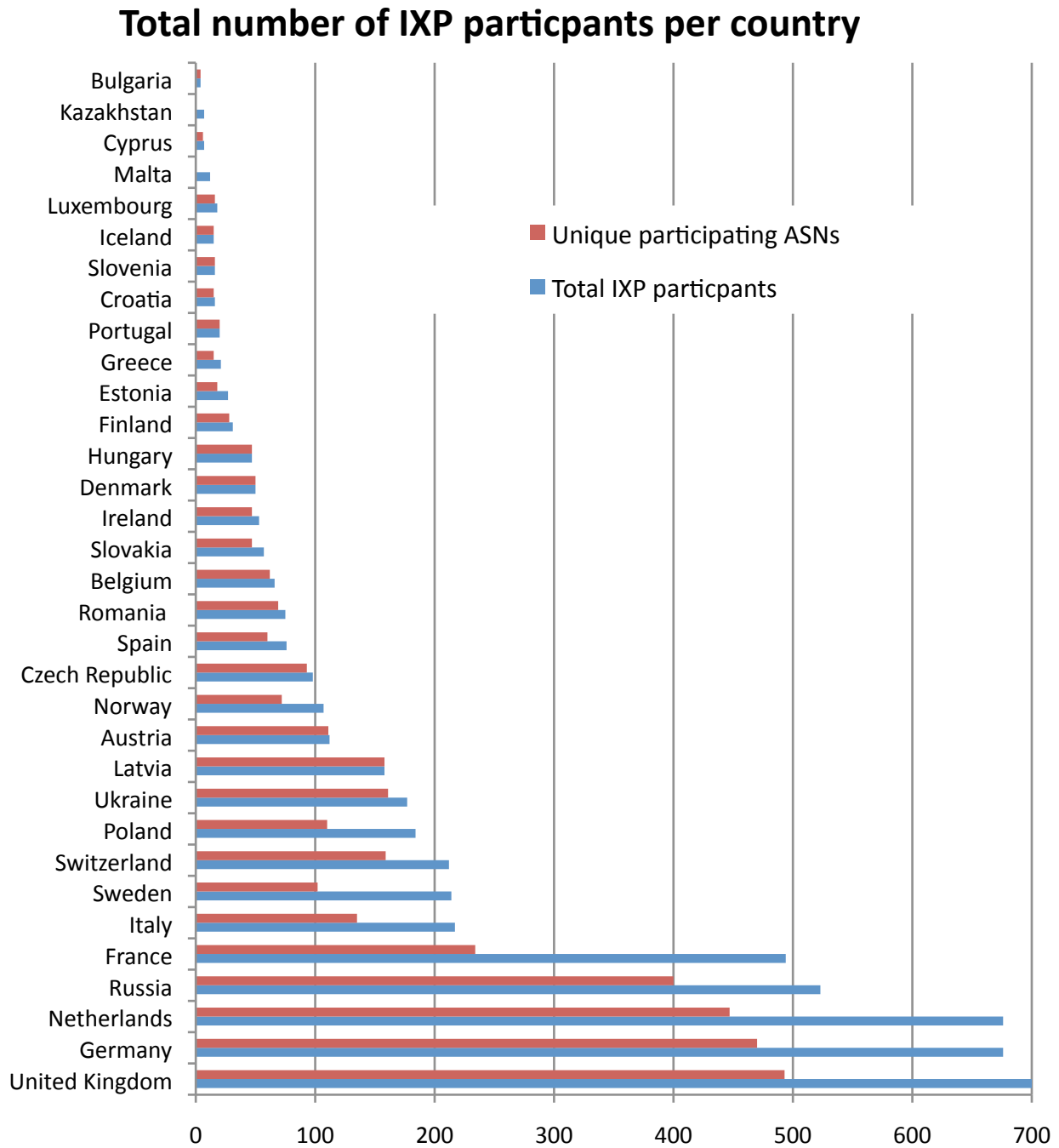
Country	Gbps	Population (in Millions)	Gpbs per M people	Internet Users (M)	Gbps per user
Austria	21.430	8.210	2.610	5.601	3.826
Belgium	17.600	10.414	1.690	7.006	2.512
Bulgaria	0.100	7.204	0.014	2.368	0.042
Croatia	0.345	4.489	0.077	2.244	0.154
Cyprus	0.100	1.084	0.092	0.324	0.309
Czech Republic	71.800	10.211	7.032	4.991	14.386
Denmark	10.400	5.500	1.891	4.629	2.247
Estonia	1.179	1.299	0.908	0.854	1.381
Finland	22.093	5.250	4.208	4.353	5.075
France	93.340	62.150	1.502	42.050	2.220
Germany	624.720	82.329	7.588	55.221	11.313
Greece	14.516	10.737	1.352	4.932	2.943
Hungary	96.300	9.905	9.722	5.500	17.509
Iceland	0.508	0.306	1.660	0.273	1.861
Ireland	4.198	4.203	0.999	2.830	1.483
Italy	48.602	58.126	0.836	29.140	1.668
Latvia	2.544	2.231	1.140	1.324	1.921
Luxembourg	0.197	0.491	0.401	0.363	0.543
Netherlands	674.980	16.715	40.382	14.272	47.294
Norway	18.850	4.660	4.045	3.993	4.721
Poland	64.170	38.482	1.668	20.020	3.205
Portugal	6.213	10.707	0.580	4.450	1.396
Romania	19.993	22.215	0.900	7.430	2.691
Russia	125.753	140.041	0.898	38.000	3.309
Slovakia	18.528	5.463	3.392	3.018	6.139
Slovenia	20.000	2.005	9.975	1.300	15.385
Spain	91.053	40.525	2.247	28.628	3.181
Sweden	121.297	9.059	13.390	7.295	16.627
Switzerland	10.730	7.604	1.411	5.762	1.862
Ukraine	52.511	45.700	1.149	6.700	7.837
United Kingdom	460.115	61.113	7.529	48.755	9.437
Total	2,714.165	688.428	3.943	363.626	7.464

Note: This data was captured on the 27th of August 2009

Section 5. IXP participants

5.1 Total number of IXP participants per country

This graph displays combined number of IXP participants in any given country. It further details the amount of unique ASNs peering in each country i.e. if an ASN is peering at more than one IXP in a country it is not being counted twice.



Note: This data was captured on the 27th of August 2009

5.2 Total number of IXP participants per country

This table details:

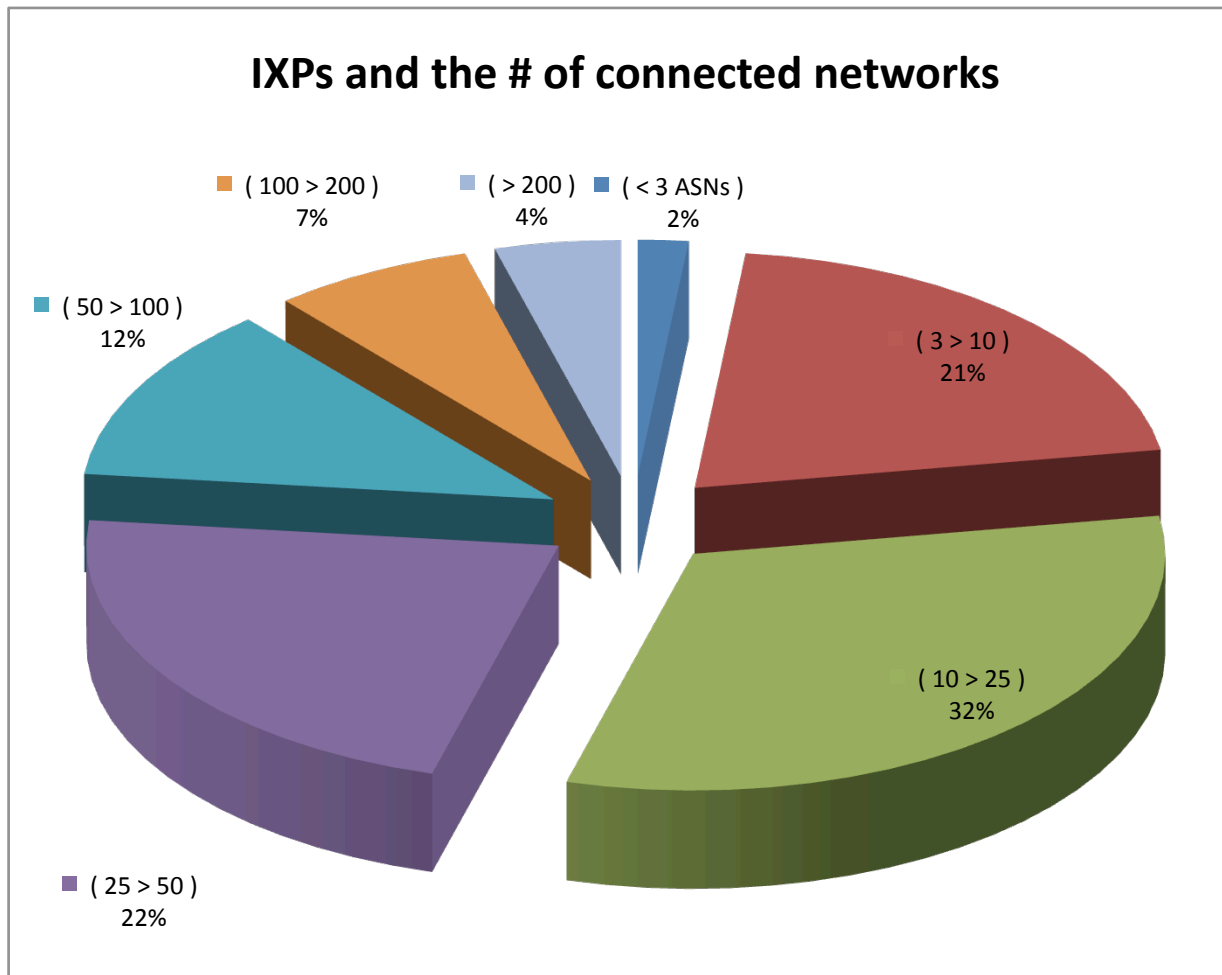
- Combined total number of IXP participants per country. This figure will include those participants that are present at more than one IXP in any given country.
- Total number of listed or published ASNs per country. In some circumstances IXP participants do not wish to publicly advertise their ASN at a particular IXP or the IXP does not publish a list of their participant's ASNs.
- Total number of unique ASNs participating per country. ASNs that participate at more than one IXP per country are only counted once in this column.

Country	Participants (a)	Published ASNs (b)	Unique ASN (c)
United Kingdom	701	672	493
Germany	676	676	470
Netherlands	676	560	447
Russia	523	469	400
France	494	394	234
Italy	217	195	135
Sweden	214	188	102
Switzerland	212	211	159
Poland	184	111	110
Ukraine	177	177	161
Latvia	158	158	158
Austria	112	111	111
Norway	107	107	72
Czech Republic	98	98	93
Spain	76	74	60
Romania	75	75	69
Belgium	66	66	62
Slovakia	57	57	47
Ireland	53	50	47
Denmark	50	50	50
Hungary	47	47	47
Finland	31	31	28
Estonia	27	27	18
Greece	21	20	15
Portugal	20	20	20
Croatia	16	15	15
Slovenia	16	16	16
Iceland	15	15	15
Luxembourg	18	18	16
Malta	12	0	N/A
Cyprus	7	7	6
Kazakhstan	7	0	N/A
Bulgaria	4	4	4
Totals	5167	4719	3680
Unique published ASNs peering at IXPs in Europe			2822
Estimated total Unique ASNs peering at IXPs in Europe			3090

Note: This data was captured on the 27th of August 2009

5.3 Percentage of IXPs and their number of participants

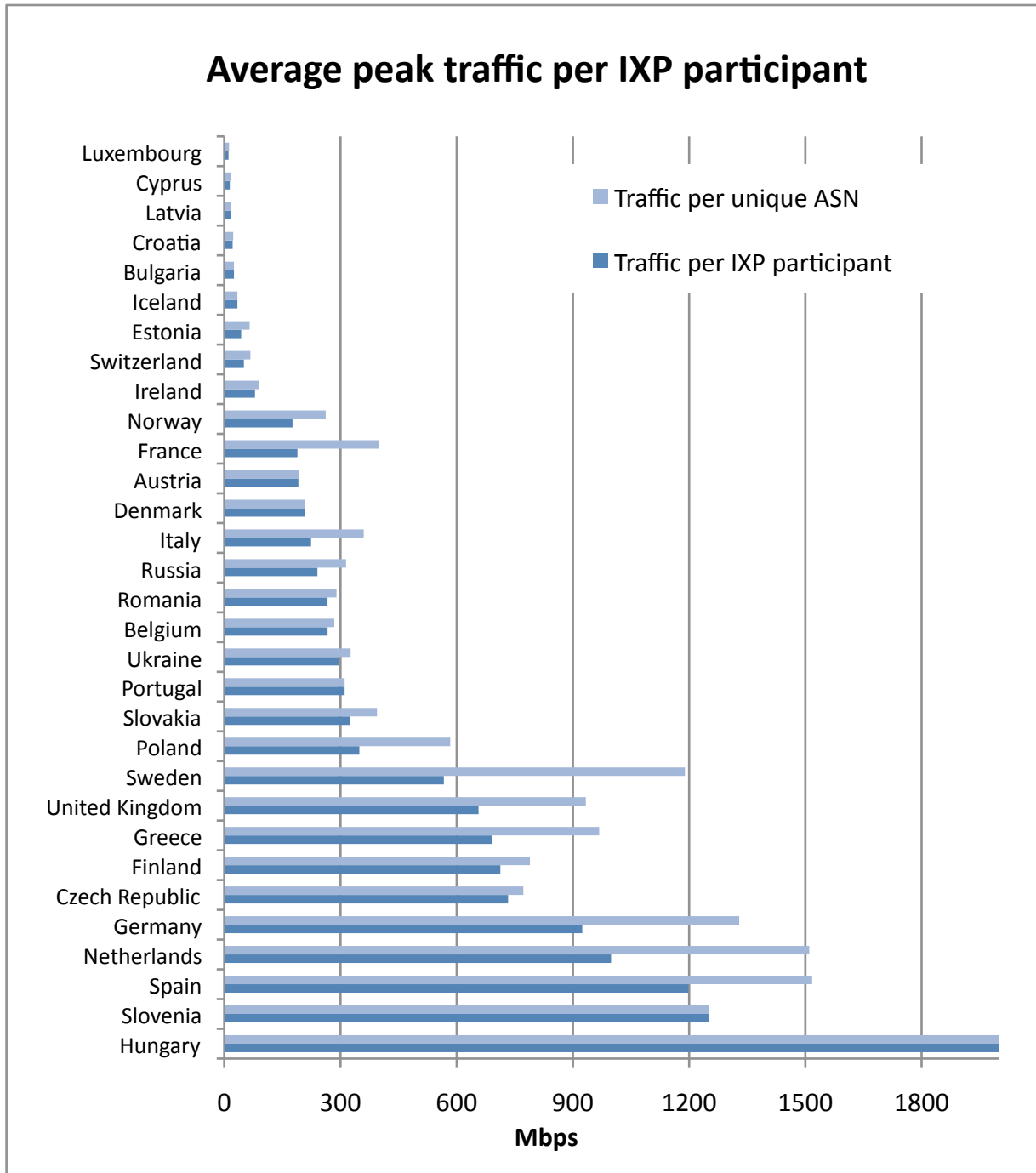
This graph highlights the percentage of European IXPs having a particular amount of participants at their exchange. Note that at 5 IXPs we were not able to collect accurate participant numbers.



# of ASNs	# of IXPs	% of total
(< 3 ASNs)	2	1.7%
(3 > 10)	24	20.7%
(10 > 25)	37	31.9%
(25 > 50)	26	22.4%
(50 > 100)	14	12.1%
(100 > 200)	8	6.9%
(> 200)	5	4.3%
	116	100.0%

5.4 Average peak traffic per IXP participant per country

This graph displays the average amount of peak traffic per IXP participant per country and furthermore displays the average amount of peak traffic per unique ASN peering in each country.



Note: This traffic data was captured on the 27th of August 2009

5.5 Average peak traffic per IXP participant per country

This table details the average amount of peak traffic per IXP participant per country as well as identifying the average peak traffic per unique participant per country. The average traffic per participant has been derived by dividing the total amount of IXP participants, in a country, by the aggregated IXP traffic within that same country. While the traffic per unique ASN has been derived by dividing the total amount of unique ASNs known to be peering in a country by the total amount of IXP traffic in a given country.

Country	Traffic in Gbps	Participants	Traffic per participant in Mbps	Unique ASNs	Traffic per unique ASN in Mbps
Austria	21.430	112	191.34	111	193.06
Belgium	17.600	66	266.67	62	283.87
Bulgaria	0.100	4	25.00	4	25.00
Croatia	0.345	16	21.56	15	23.00
Cyprus	0.100	7	14.29	6	16.67
Czech Republic	71.800	98	732.65	93	772.04
Denmark	10.400	50	208.00	50	208.00
Estonia	1.179	27	43.67	18	65.50
Finland	22.093	31	712.68	28	789.04
France	93.340	494	188.95	234	398.89
Germany	624.720	676	924.14	470	1329.19
Greece	14.516	21	691.24	15	967.73
Hungary	96.300	47	2048.94	47	2048.94
Iceland	0.508	15	33.87	15	33.87
Ireland	4.198	53	79.21	47	89.32
Italy	48.602	217	223.97	135	360.01
Latvia	2.544	158	16.10	158	16.10
Luxembourg	0.197	18	10.94	16	12.31
Netherlands	674.980	676	998.49	447	1510.02
Norway	18.850	107	176.17	72	261.81
Poland	64.170	184	348.75	110	583.36
Portugal	6.213	20	310.65	20	310.65
Romania	19.993	75	266.57	69	289.75
Russia	125.753	523	240.45	400	314.38
Slovakia	18.528	57	325.05	47	394.21
Slovenia	20.000	16	1250.00	16	1250.00
Spain	91.053	76	1198.07	60	1517.55
Sweden	121.297	214	566.81	102	1189.19
Switzerland	10.730	212	50.61	159	67.48
Ukraine	52.511	177	296.67	161	326.16
United Kingdom	460.115	701	656.37	493	933.30
Europe	2714.165	5148	437.26	3680	571.74

Note: This traffic data was captured on the 27th of August 2009

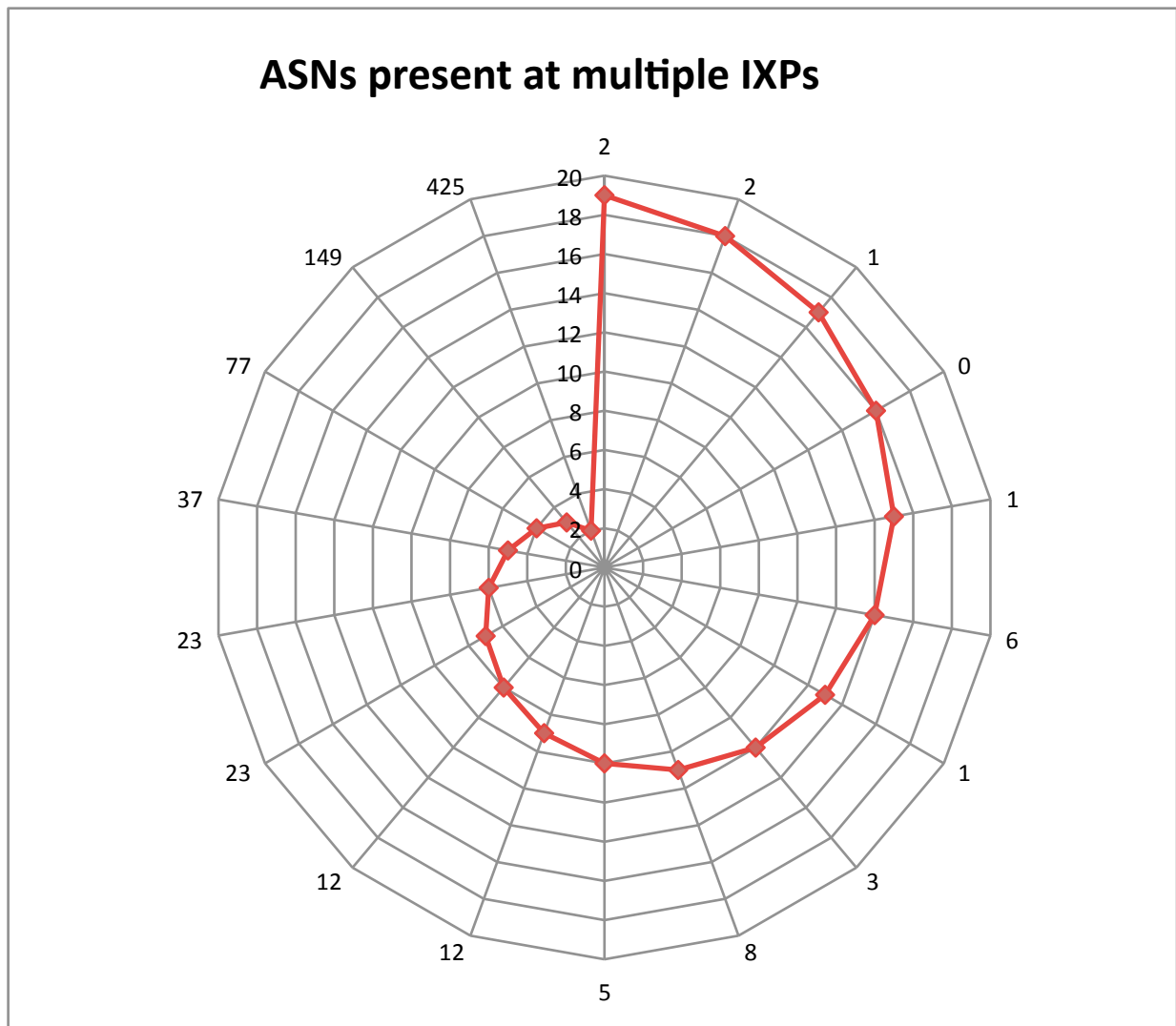
5.6 Number of ASNs present at more than one IXP in Europe

The chart below details the number of ASNs that are present at more than one European IXP.

The numbers bordering the circumference of the chart are the amount of ASNs that peer at a particular number of IXPs. The numbers starting at the centre of the chart and moving to the outside are the number of IXPs that the ASNs are present at.

Starting from the centre the chart shows that 425 ASNs peer at two IXPs, 149 ASNs peer at three IXP, 77 ASNs peer at four IXPs, etc. While the outermost ring of the chart shows that two ASNs peer at no less than 19 different European IXPs.

In total some 782 ASNs peer at more than one European IXP.



Note: This data was captured on the 27th of August 2009

5.7 ASNs present at more than one IXP in Europe

The table below details the number of ASNs that are present at more than one European IXP. The ASN column displays the actual AS number of those 29 participants that peer at 10 or more European IXPs.

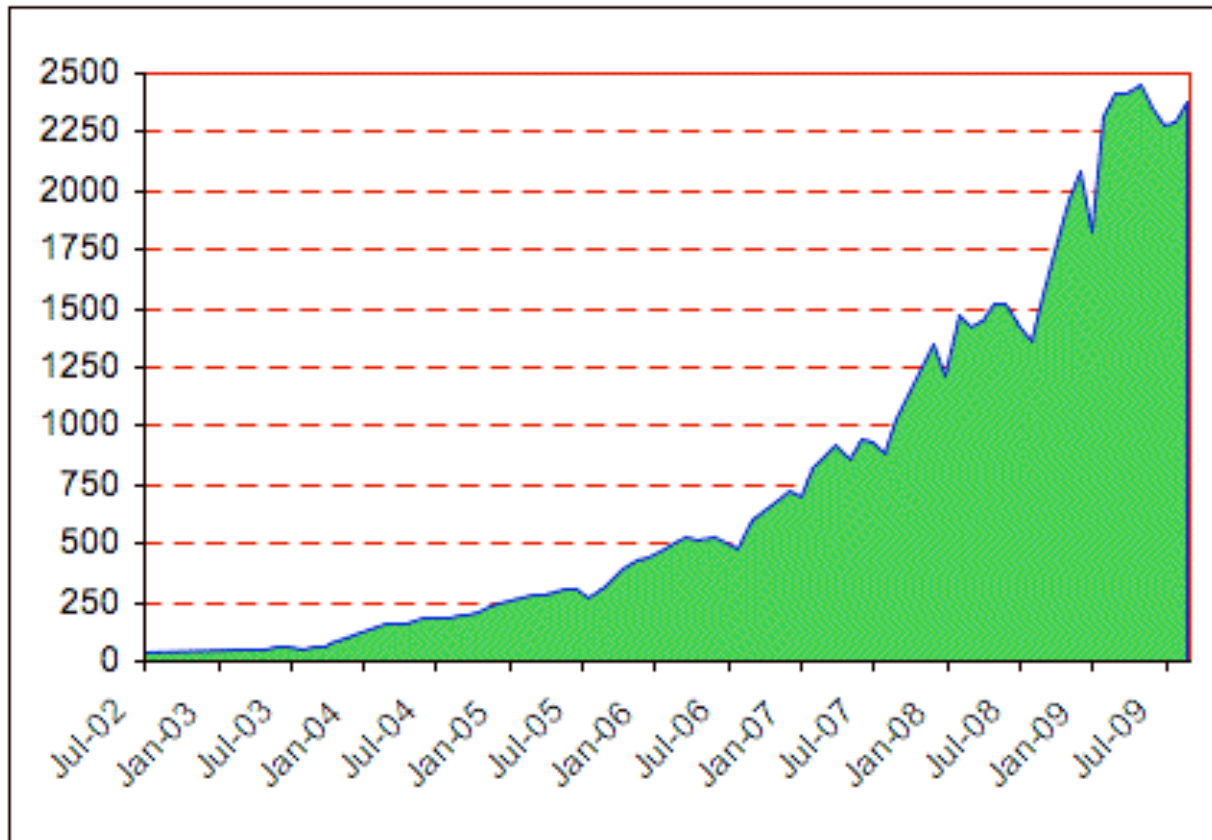
# of IXPs	# of ASNs	ASN
19	2	AS174, AS8928
18	2	AS702, AS2686
17	1	AS8220
16	0	-
15	1	AS20940
14	6	AS286, AS1257, AS13030, AS15169, AS16265, AS16276
13	1	AS8218
12	3	AS6820, AS9002, AS13237
11	8	AS3303, AS3239, AS3327, AS3856, AS8473, AS13101, AS16150, AS22822
10	5	AS1267, AS6453, AS6939, AS26415, AS41692
9	12	-
8	12	-
7	23	-
6	23	-
5	37	-
4	77	-
3	149	-
2	425	-
Total ASNs at > 1 IXP		782

Note: This data was captured on the 27th of August 2009

Section 6. European IXP aggregated peak traffic trends

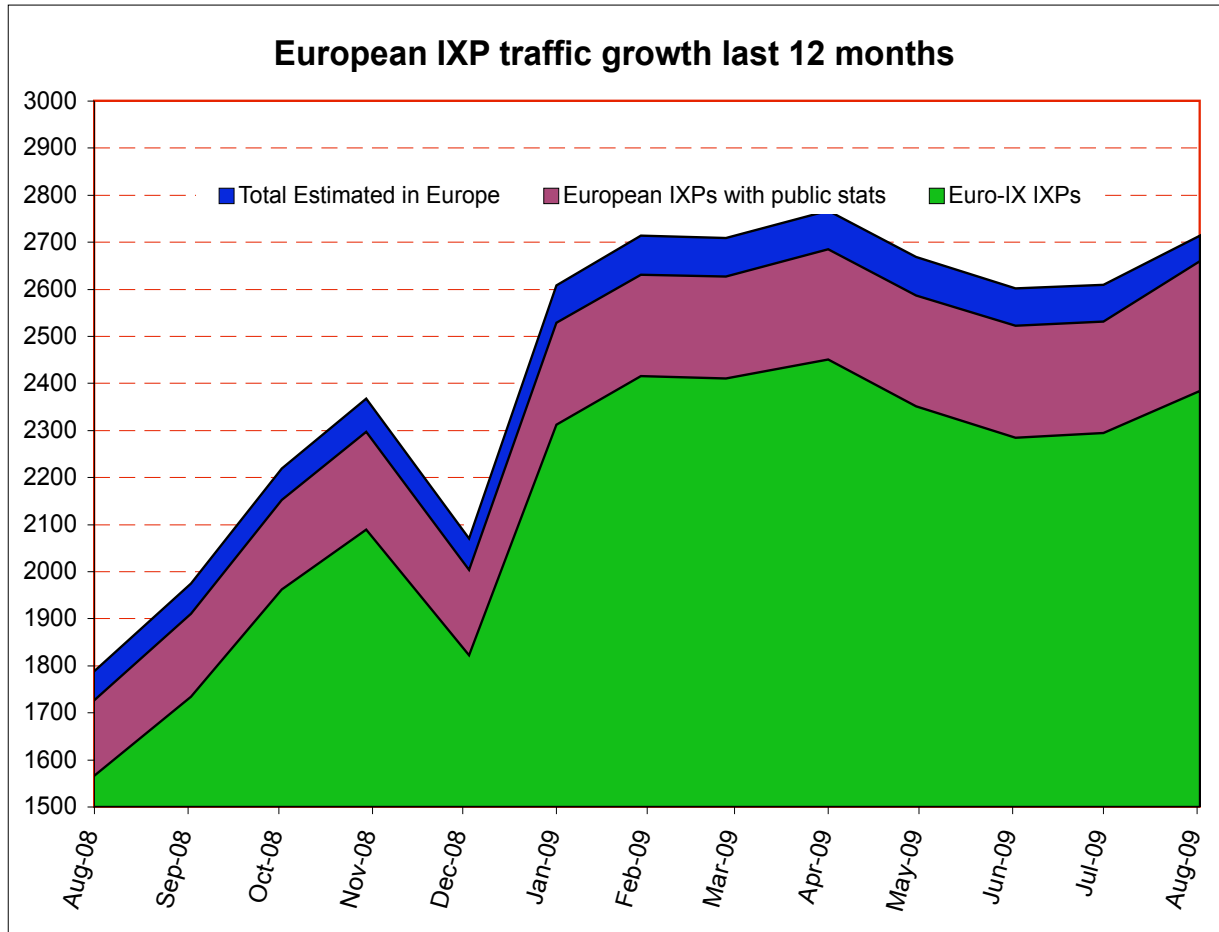
6.1 Aggregated peak traffic history 2002 - 2009

The graph displays the history of peak traffic of the Euro-IX membership since July 2002. The traffic statistics have been taken on a monthly basis from some 38 IXPs across Europe



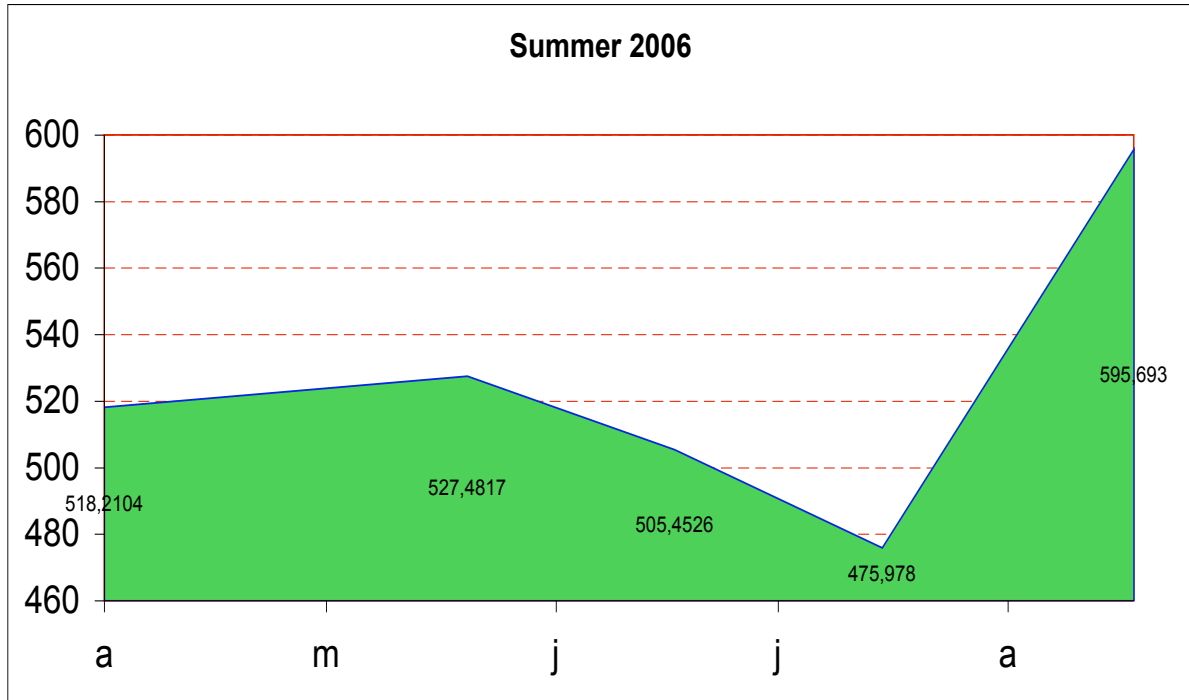
6.2 European traffic growth over 12 months – August 2008 to August 2009

The graph below shows the aggregated peak traffic of the 38 Euro-IX member IXPs that have public traffic statistics as well another 39 European IXPs. On the 27th of August 2009 the aggregated peak traffic of all 69 IXPs that have publicly viewable statistics came to 2.714 Tbps.



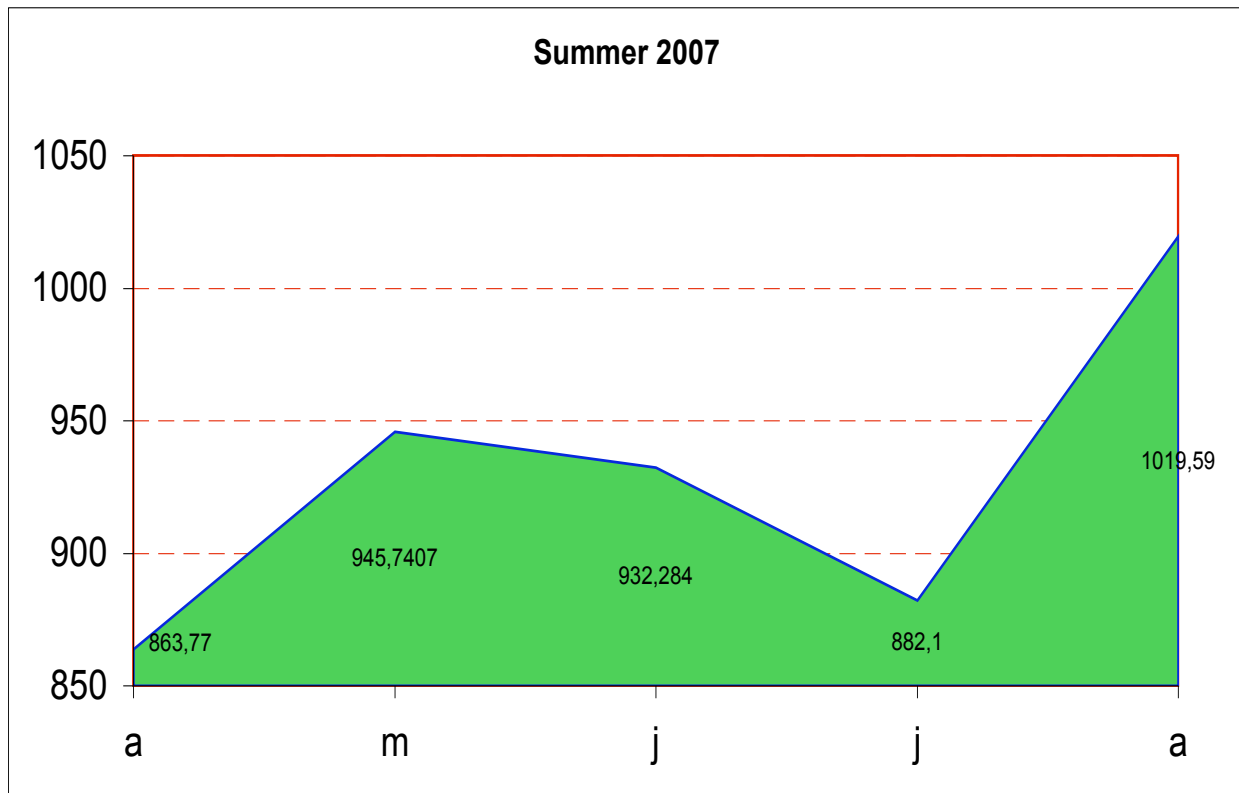
6.3 Summer peak traffic trend in Europe: 2006

This graph displays the aggregated IXP peak traffic during the summer of 2006. Drops in monthly peak traffic can be seen in both June and July of that year. The end of July to end of August peak increase was over 25% in 2006.



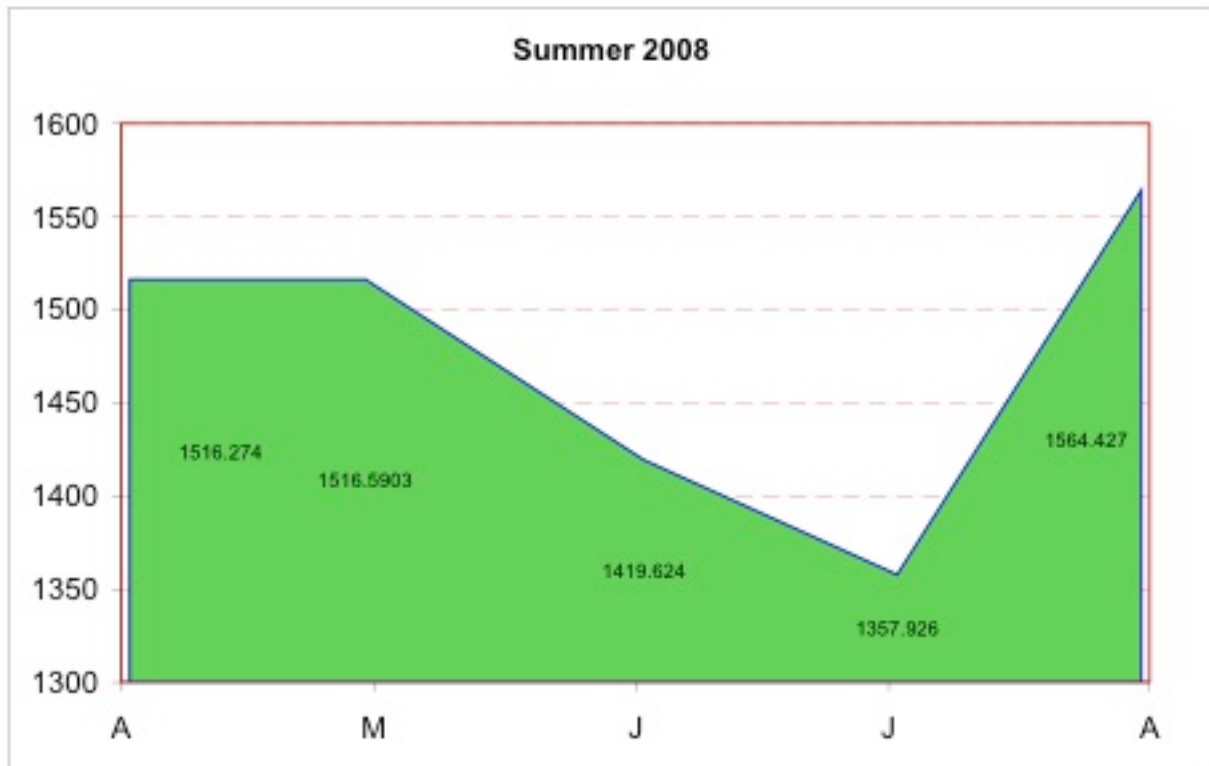
6.4 Summer peak traffic trend in Europe: 2007

This graph displays the aggregated IXP peak traffic during the summer of 2007. Drops in monthly peak traffic can be seen as early as April, this is widely agreed by IXPs across Europe that it was due to the unusually early warm weather that was experienced for about four weeks across the continent. After this warm weather period, the traffic returned to normal in May and then the usual summer trend of a decrease in aggregated traffic occurred and once again by mid to late August the traffic started to increase once again.



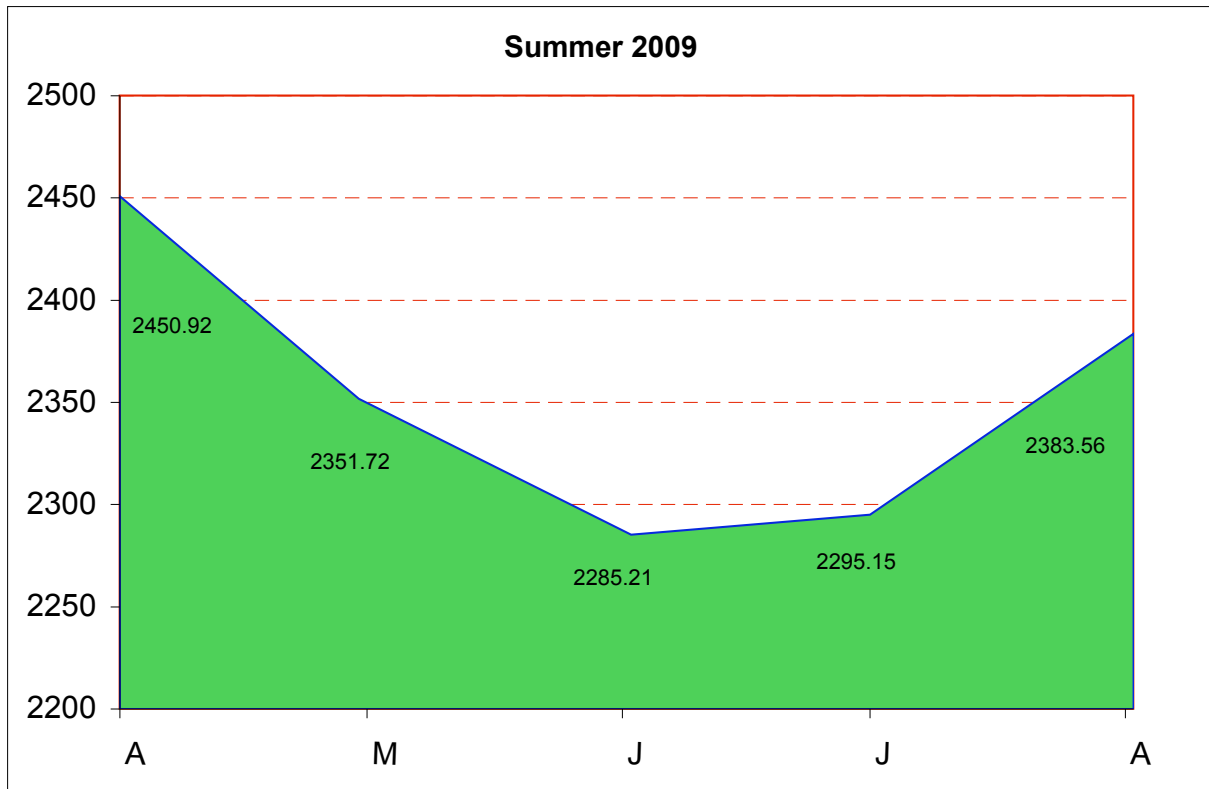
6.5 Summer peak traffic trend in Europe: 2008

This graph displays the aggregated IXP peak traffic during the summer of 2008. Showing a steady drop in peak IXP traffic through the summer months and a clear increase in traffic by the end of August, however the increase in peak traffic from the end of April to the end of August 2008 was only some 3.17% which is significantly down of the increase recorded in 2007 of 18.3% and in 2006 of 14.95% over the same period.



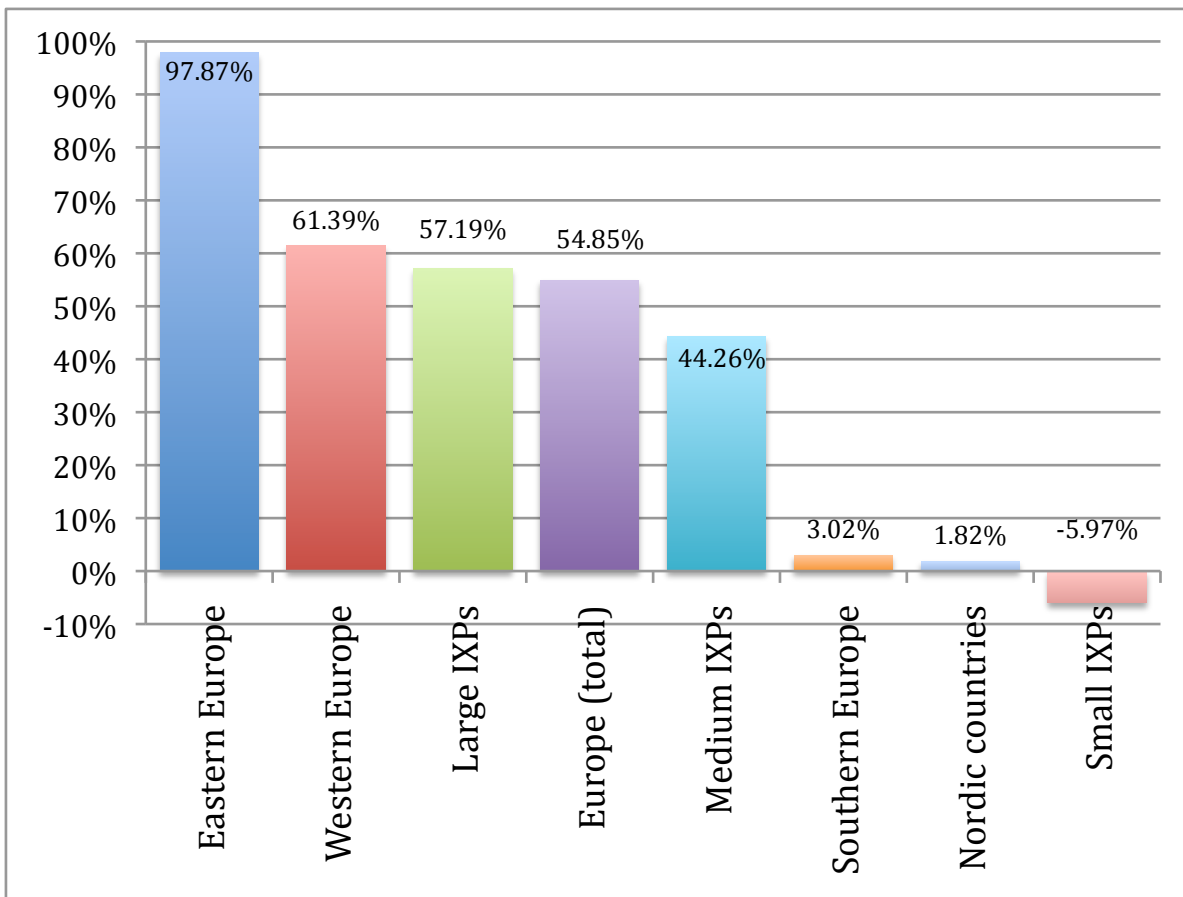
6.6 Summer peak traffic trend in Europe: 2009

This graph displays the aggregated IXP peak traffic during the summer of 2009. Showing a steady drop in peak IXP traffic through the summer months and a clear increase in traffic by the end of August, however the increase in peak traffic at the end of August still did not match the levels of peak traffic that were seen in April of that same year. This is a clear break in the trend that was seen in 2006 to 2008.



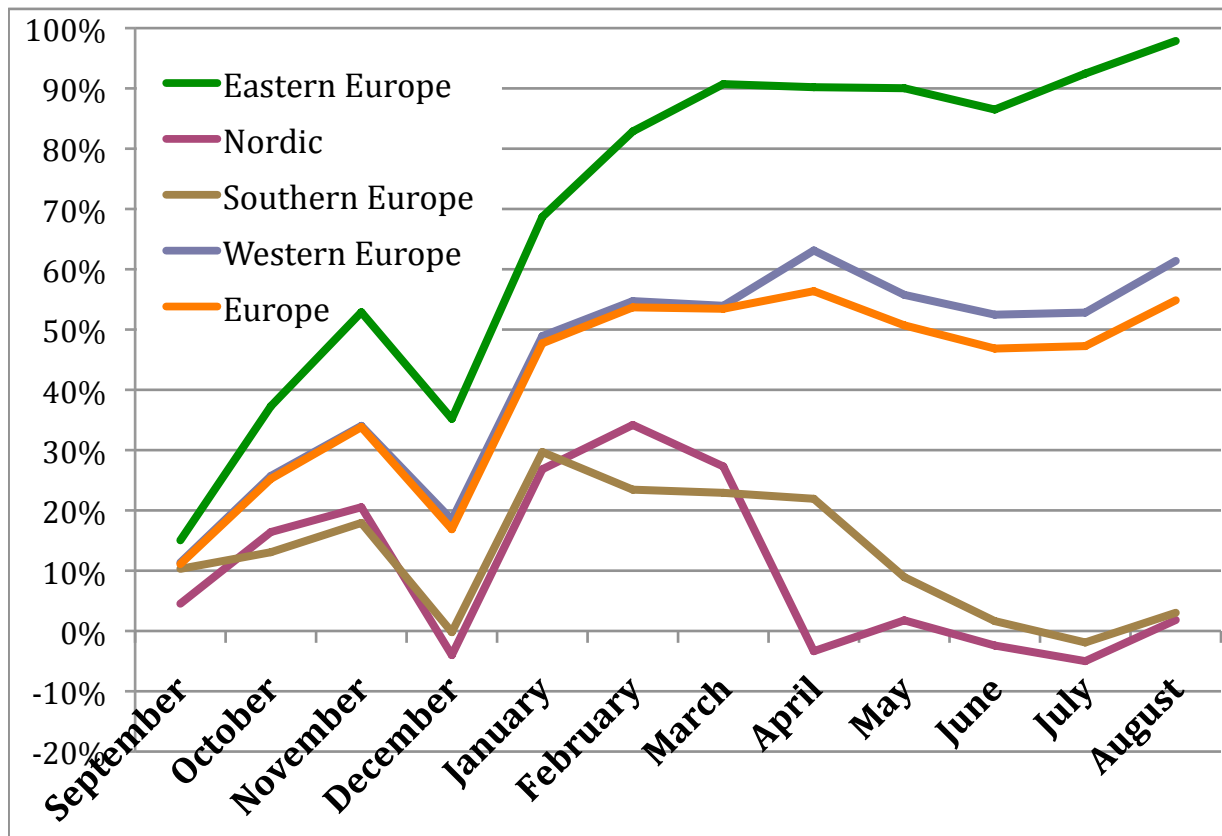
6.7 Categorized and regional IXP annual growth rate comparison

This graph displays the aggregated IXP peak traffic growth between the end of August 2008 and the end of August 2009. The IXPs have been categorized into different regions and sizes. Large IXPs are those whose peak traffic exceeds 50 Gbps, medium IXPs are those whose peak traffic is between 2 Gbps and 50 Gbps and small IXPs are those whose peak traffic does not exceed 2 Gbps.



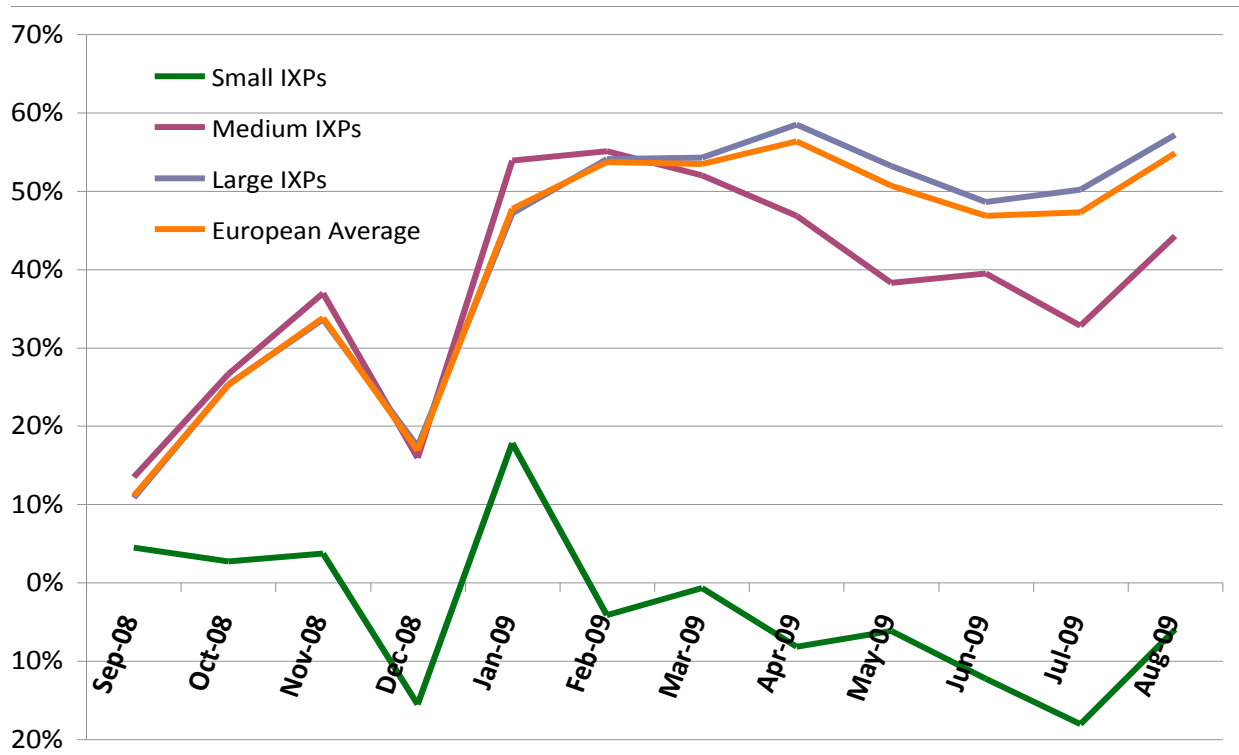
6.8 Regional monthly growth rates

This graph displays the aggregated IXP peak traffic monthly growth rate between the end of August 2008 and the end of August 2009. The IXPs have been categorized into different European regions. The graph shows that the Eastern European IXPs have been clearly dominating IXP growth rates in Europe over the last 12 months.



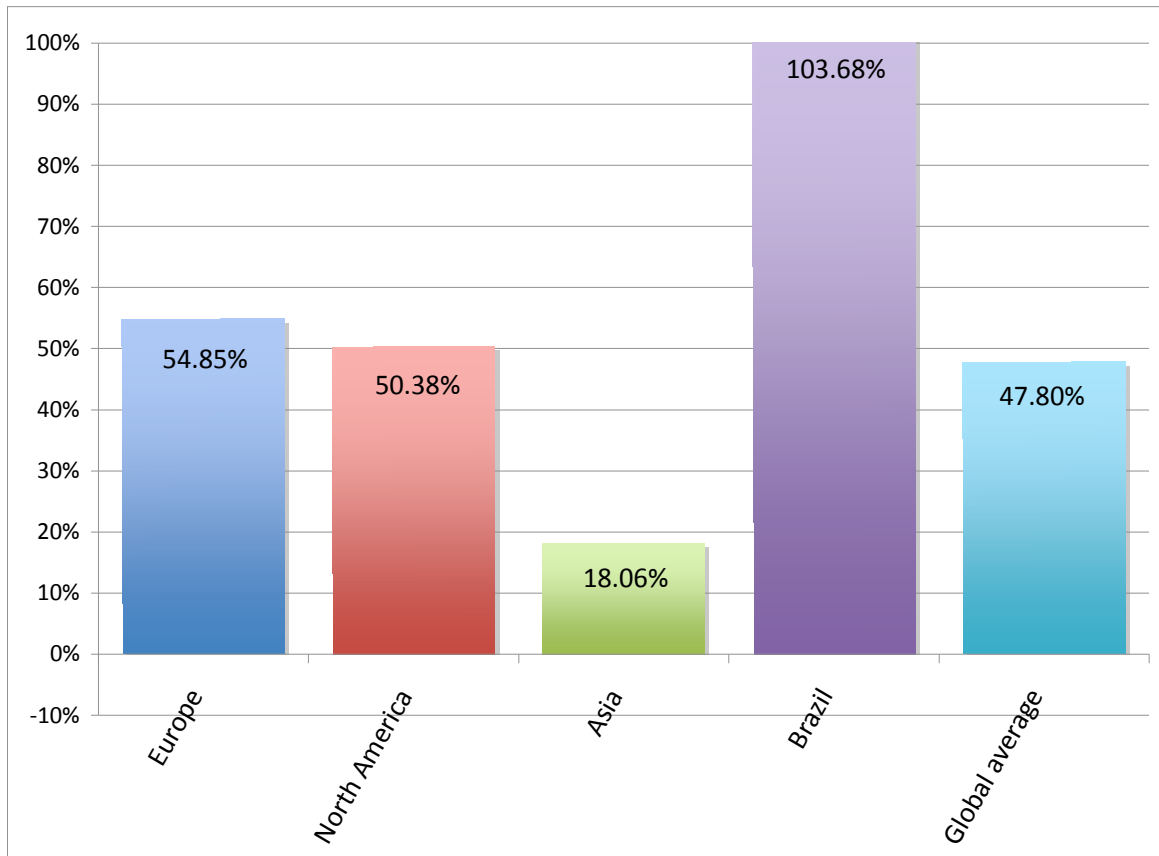
6.9 Categorized monthly growth rates

This graph displays the aggregated IXP peak traffic monthly growth rates between the end of August 2008 and the end of August 2009. The IXPs have been categorized into different sizes. Large IXPs are those whose peak traffic exceeds 50 Gbps, medium IXPs are those whose peak traffic is between 2 Gbps and 50 Gbps and small IXPs are those whose peak traffic does not exceed 2 Gbps.



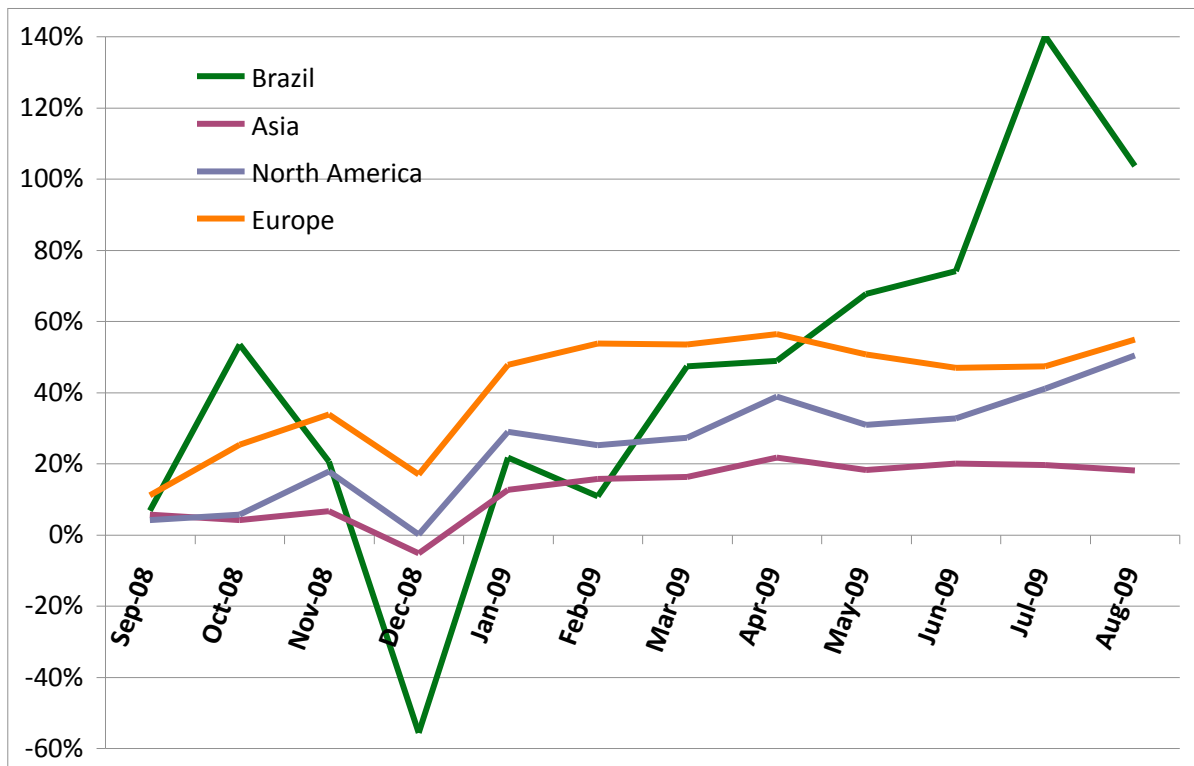
6.10 Global annual IXP growth rate comparison

This graph displays the aggregated IXP peak traffic growth between the end of August 2008 and the end of August 2009, at European, North American, Asian and Brazilian IXPs. It should be noted that the peak traffic data was collected over a 12-month period from some 69 European IXPs while Euro-IX could only gather accurate data from ten Asian IXPs, six North American and eight Brazilian IXPs.



6.11 Global monthly IXP growth rates

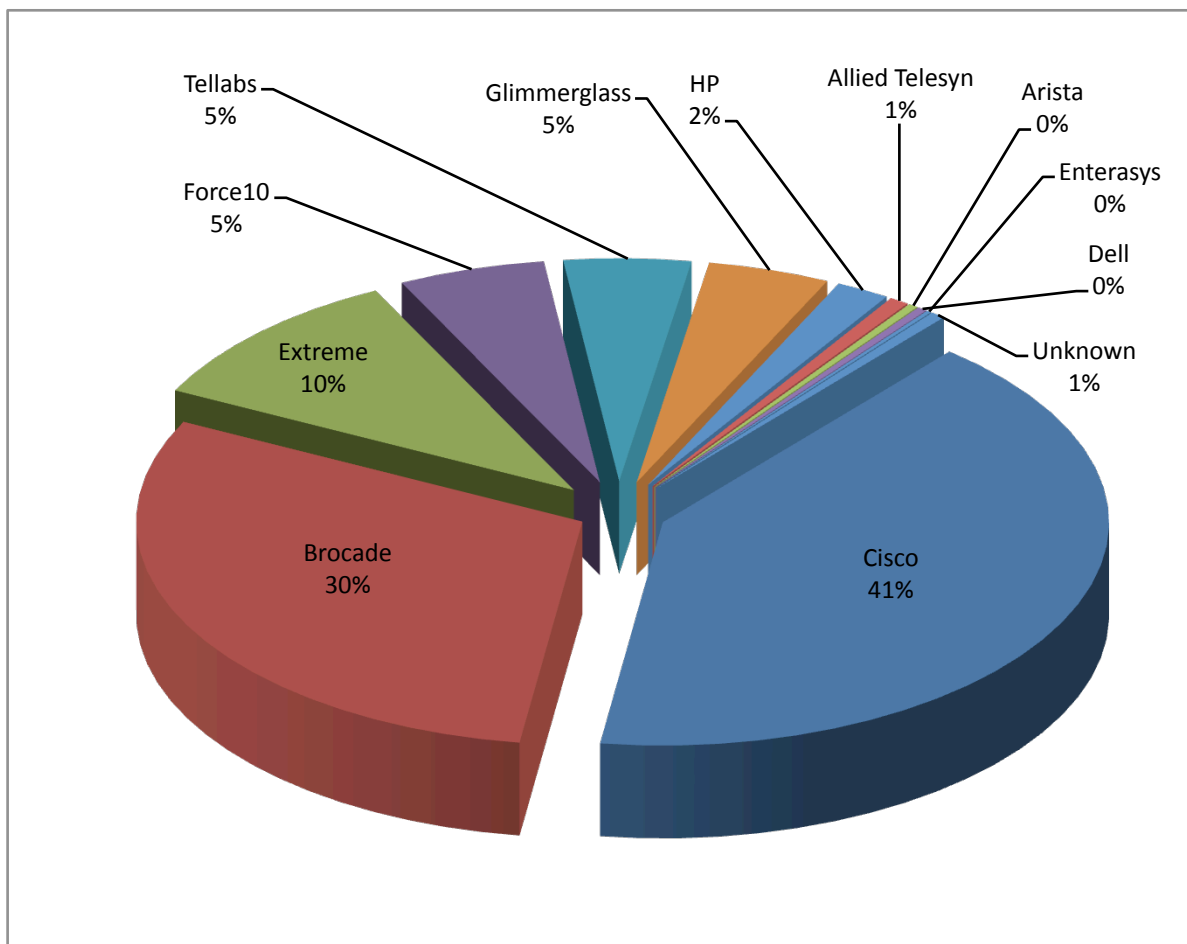
This graph displays the aggregated IXP peak traffic growth per month between the end of August 2008 and the end of August 2009, at European, North American, Asian and Brazilian IXPs. It should be noted that the peak traffic data was collected over a 12-month period from some 69 European IXPs while Euro-IX could only gather accurate data from ten Asian IXPs, six North American and eight Brazilian IXPs.



Section 7. IXP switching platform technology

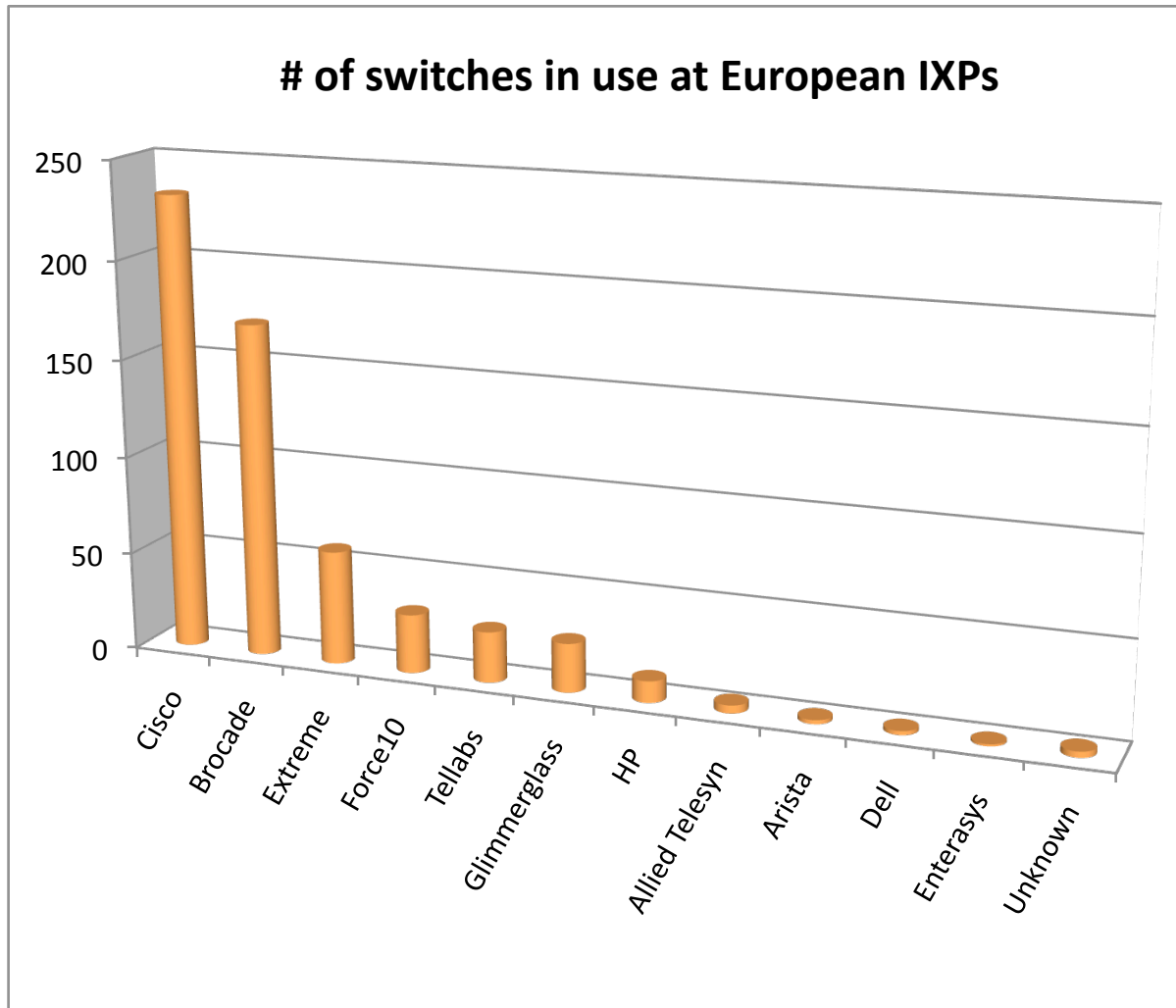
7.1 Percentage of the European IXP market share for switch vendors

This graph outlines the percentage of European IXP market share that a particular switch vendor has. The 'unknown' switches relates to the fact that Euro-IX was unable to collect accurate information on the brand of these switches.



7.2 Number of switches in use at European IXPs

This graph displays the number of a particular brand of switch being used by IXPs across Europe. The 'unknown' switches relates to the fact that Euro-IX was unable to collect accurate information on the brand of these switches.



7.3 European IXP's choice of switch vendor

This table details the number of particular vendor's switches being used at IXPs across Europe and the percentage change from 2008 figures. The 'unknown' switches relates to the fact that Euro-IX was unable to collect accurate information on the brand of these switches, this number has been somewhat reduced in 2009.

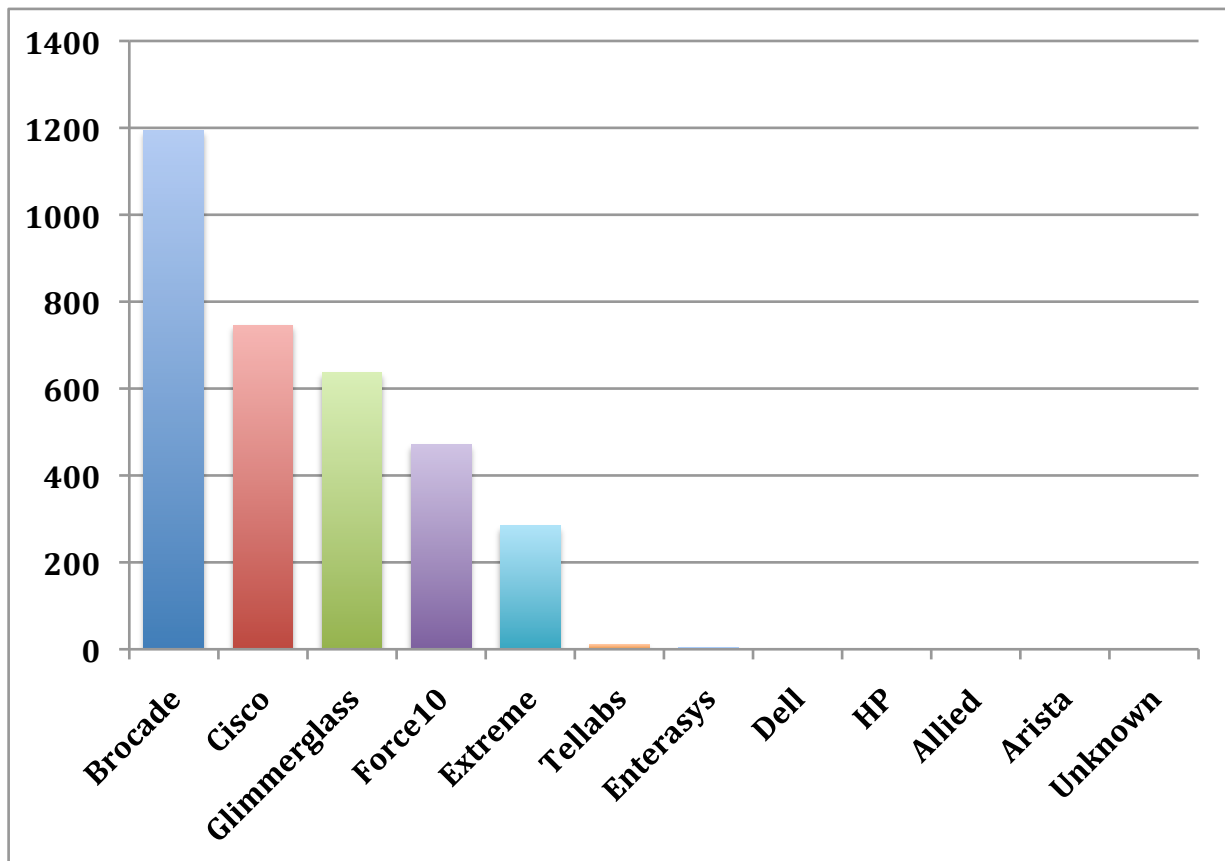
Switch vendor	Number of switches 2009	Percentage of total	Number of switches 2008	Percentage change
Cisco	232	40.9%	209	11.00%
Brocade	170	30.0%	115	47.83%
Extreme	58	10.2%	49	18.37%
Force10	30	5.3%	14	114.29%
Tellabs	26	4.6%	0	100.00%
Glimmerglass	25	4.4%	19	31.58%
HP	11	1.9%	5	120.00%
Allied Telesyn	4	0.7%	4	0.00%
Arista	2	0.4%	0	100.00%
Dell	2	0.4%	3	-33.33%
Enterasys	1	0.2%	2	-50.00%
Unknown	3	0.5%	14	-78.57%
Total	564		434	29.95%

This table details the number of European IXPs that use a particular brand of switch and the percentage change from 2008 figures. Note that in some cases IXPs use more than one brand of switch at their IXP.

Switch vendor	Number of IXPs 2009	Percentage of all IXPs	Number of IXPs 2008	Percentage change
Cisco	81	67%	66	22.73%
Brocade	24	20%	23	4.35%
Extreme	16	13%	5	220.00%
Force10	6	5%	5	20.00%
HP	4	3%	2	100.00%
Dell	2	2%	3	-33.33%
Allied Telesyn	1	1%	1	0.00%
Arista	1	1%	0	100.00%
Enterasys	1	1%	1	0.00%
Glimmerglass	1	1%	1	0.00%
Tellabs	1	1%	1	0.00%
Unknown	3	2%	9	-66.67%

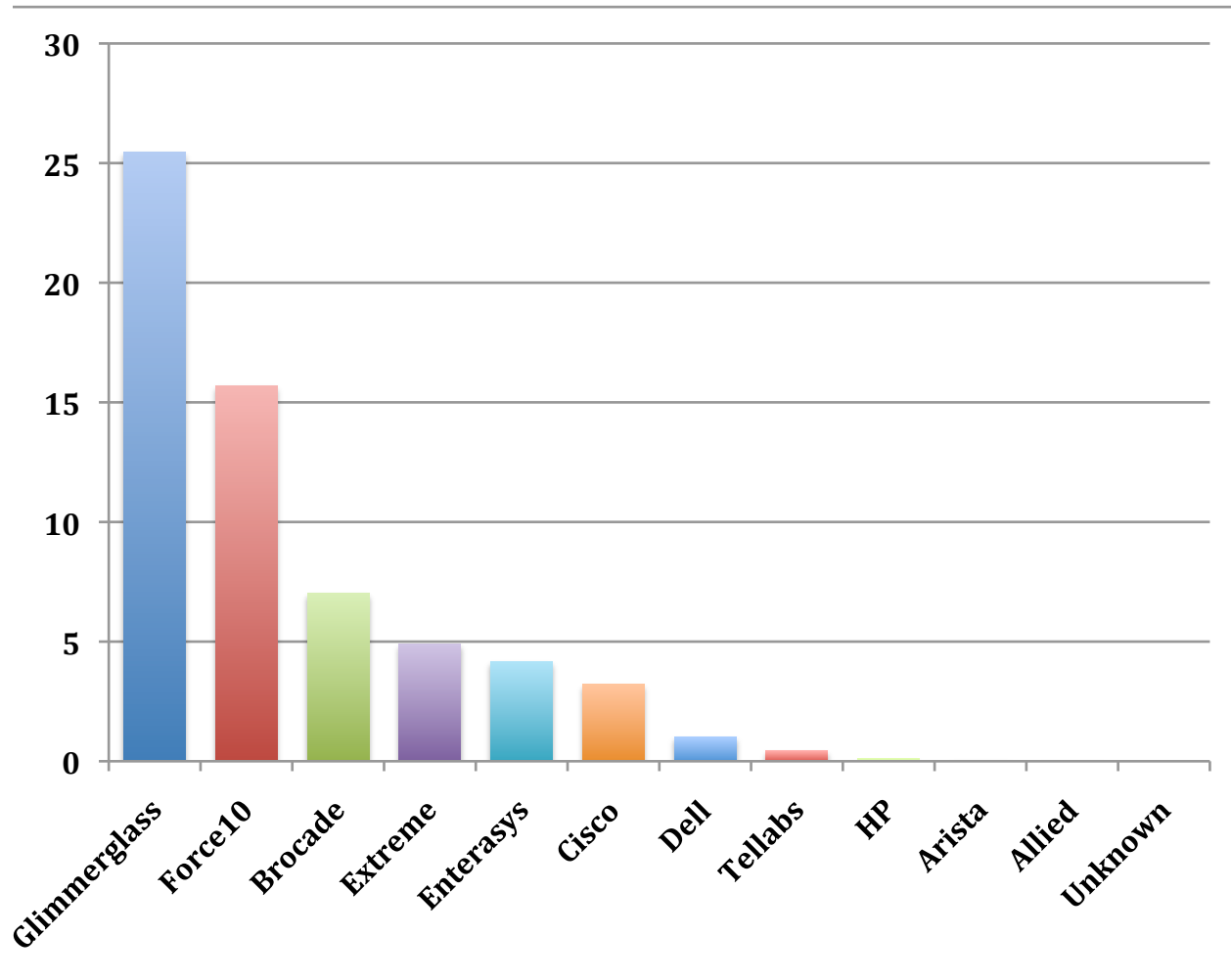
7.4 Amount of IXP traffic passing over a particular switch brand (in Gbps)

This graph displays the aggregated amount of peak IXP traffic, in Gbps, that passes over a particular brand of switch that is in use at European IXPs. In the case where a IXP uses multiple brands of switches the traffic was simply divided by the number of switches to calculate the brands share of traffic.



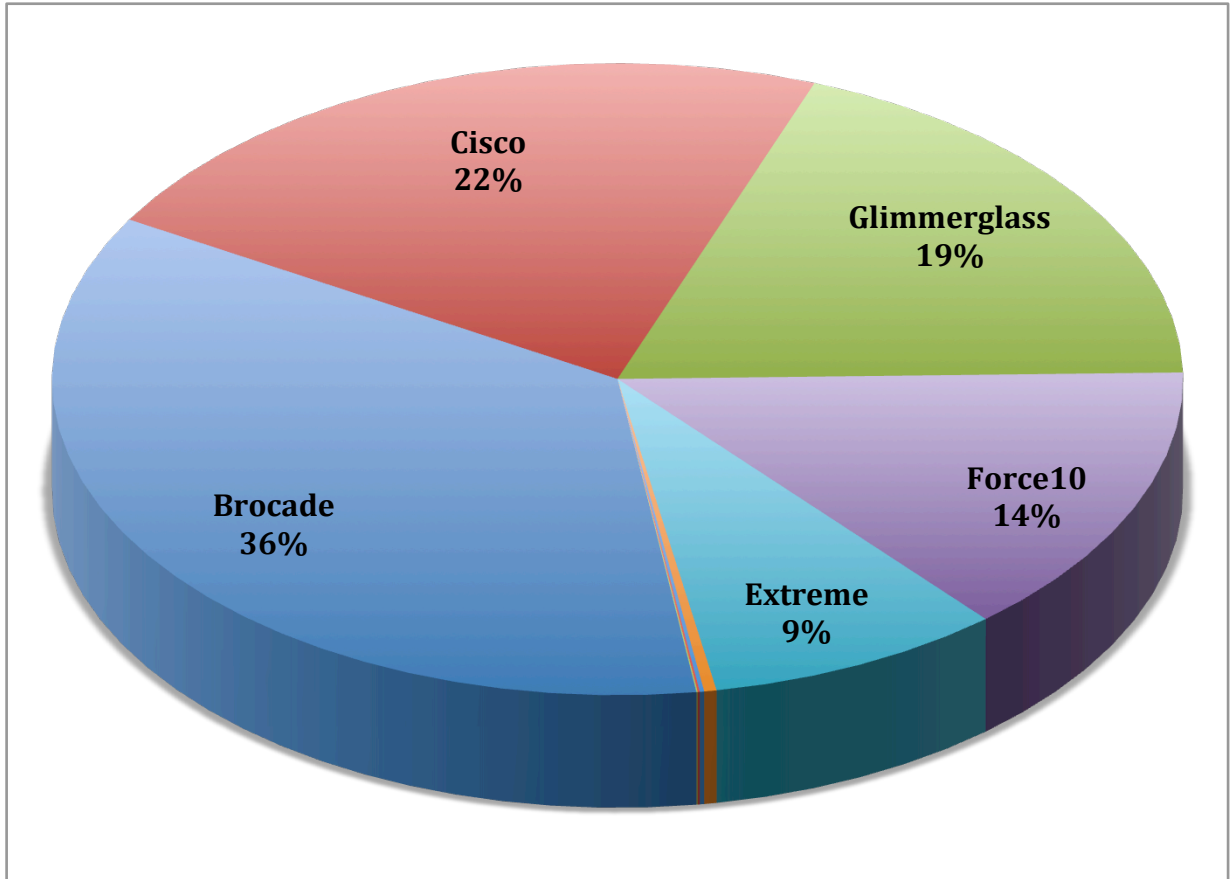
7.5 Amount of peak IXP traffic per switch (in Gbps)

This graph displays the average amount of peak traffic that passes over a particular switch at European IXPs. These figures were calculated by dividing the amount of traffic by the number of switches in use at an IXP, in the case where an IXP uses multiple brands of switches the aggregated traffic was simply divided into equal switch shares.



7.6 Aggregated IXP traffic share of a particular switch brand

This graph displays the aggregated European IXP traffic share of a particular switch brand.



7.7 Amount of peak IXP traffic passing over a particular brand of switch

This table details the aggregated amount of peak IXP traffic that passes over a particular brand of switch and further breaking this down into per IXP and per switch traffic calculations. These figures were calculated by dividing the amount of traffic by the number of switches in use at an IXP, in the case where an IXP uses multiple brands of switches the aggregated traffic was simply divided into equal switch shares.

Switch vendor	# of IXPs	# of switches	Traffic in Gbps	% of total	Traffic per IXP (Gbps)	Traffic per switch (Gbps)
Allied	1	4	0	0.01%	0.176	0.044
Arista	1	2	0	0.00%	0.100	0.050
Brocade	24	170	1194	35.64%	49.761	7.025
Cisco	81	232	746	22.25%	9.206	3.214
Dell	2	2	2	0.06%	1.022	1.022
Enterasys	1	1	4	0.12%	4.163	4.163
Extreme	16	58	284	8.48%	17.752	4.897
Force10	7	30	471	14.05%	67.256	15.693
Glimmerglass	1	25	637	19.01%	637.000	25.480
HP	4	11	1	0.03%	0.270	0.098
Tellabs	1	26	12	0.35%	11.800	0.454
Unknown	4	3	0	0.00%	0.000	0.000

Section 8. Further information

8.1 Resources

In an effort to seek out further information regarding IXPs that we were not able to get in direct contact with we made use of the **Peering Db** <https://www.peeringdb.com/> and we would like to express our appreciation to those responsible for managing this database.

Of course we would like to additionally thank all of the European IXPs, especially those that provide publicly available information of traffic statistics and participant's ASNs.

The biggest *thank you* goes to the 48 affiliated Euro-IX member and associate member IXPs that commit themselves to openly exchanging information with the rest of the IXP community via the Euro-IX website and the biannual Euro-IX Forums. Thank you Euro-IX members ☺

8.2 About the author:

Serge Radovic is the Secretary General of Euro-IX. After deciding to hang up his paddle and leave the world of whitewater kayak instructing behind in 1999, he has since 2000 been closely involved in working with European Internet Exchange Points. He is in personal and regular contact with more than 80 European IXPs and does his best to keep an eye of the rest of the community in Europe and other regions around the world!

8.3 Contact

We very much welcome all forms of feedback and suggestions concerning this report and will do our best to answer any further requests for information.

Serge Radovic

[*serge@euro-ix.net*](mailto:serge@euro-ix.net)

[*http://www.euro-ix.net*](http://www.euro-ix.net)