European Internet Exchange Association

2007 Report on European IXPs

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http://www.euro-ix.net

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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 co-ordinate 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 36 member IXPs from some 23 European countries, as well as 7 IXPs from Japan and the United States and four patrons from the switch vendor 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
CIXP	Geneva	Switzerland
DE-CIX	Frankfurt	Germany
ESPANIX	Madrid	Spain
FICIX	Helsinki	Finland
GigaPIX	Lisbon	Portugal
GN-IX	Groningen	Netherlands
INEX	Dublin	Ireland
LINX	London	United Kingdom
LIPEX	London	United Kingdom
LIX	Luxembourg	Luxembourg
LONAP	London	United Kingdom
Lyonix	Lyon	France
MIX	Milan	Italy
MSK-IX	Moscow	Russia
NaMeX	Rome	Italy
NDIX	17 locations	Germany/Netherlands
Netnod	Stockholm	Sweden
NIX	Oslo	Norway
NIX.CZ	Prague	Czech Republic
PacketExchange	26 Locations	Europe
PARIX	Paris	France
PL-IX	Warsaw	Poland
RoNIX	Bucharest	Romania
SIX	Ljubljana	Slovenia
SwissIX	Zurich	Switzerland
TIX	Zurich	Switzerland
TIX-Tuscany	Florence	Italy
TOP-IX	16 locations	Northwest Italy
UA-IX	Kiev	Ukraine
VIX	Vienna	Austria

1.4.2 Euro-IX Associate Member IXPs (outside of Europe)

Any2 Exchange	United States
BBIX	Japan
Equinix	United States
JPIX	Japan
JPNAP	Japan
NOTA	United States
Switch and Data	United States

1.4.3 Euro-IX Patrons

Cisco Systems
Force10 Networks
Foundry Networks
Glimmerglass

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 29h of August 2007. These traffic figures do not take into account Privately Interconnected participants whose traffic does not pass over the IXP switching fabric.*

ii. *Not all European IXPs publicly publish aggregated traffic statistics thus no attempts at estimates were made where true figures were not presented. For example while Denmark has an IXP with significant peering traffic, these figures were omitted from the report.*

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 a business 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 2006 report have not been included in the 2007 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: GNI, MAD-IX, SovEX, SVIX, Scotix, Union-IX and WorldIX.*

viii. *In 2007 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 84 of the 103 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.*

Section 2. IXPs in Europe

2.1 IXPs listed per country

The following pages list all *known* IXPs in Europe. This totals some **103 IXPs in 96 cities in 31 countries**.

Austria (1)

VIX	Vienna Internet eXchange	Vienna

Belgium (3)

BNIX	Belgian National Internet Exchange	Brussels
FreeBIX	FreeBIX	Brussels
PacketExchange	PacketExchange	Brussels

Croatia (1)

CIX	Croatian Internet eXchange	Zagreb

Cyprus (1)

CyIX	Cyprus Internet Exchange	Nicosia

Czech Republic (3)

CBIX	Commercial Brno Internet Exchange	Brno
NFX	Neutral czFree eXchange	Prague
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 (2)

FICIX	Finnish Communication and Internet Exchange	Helsinki
TREX	Tampere Region Exchange	Tampere

France (13)

EuroGIX	Euopean Global Internet eXchange	Strasbourg
FNIX6	French National Internet Exchange IPv6	Paris
FreeIX	Free Internet Exchange	Paris
GEIX	Gigabit European Internet eXchange	Paris
Lyonix	Lyonix	Lyon
MAE - Paris	MAE - Paris	Paris
MA-IX	Marseille Internet Exchange	Marseille
MIXT	MIXT	Paris
PacketExchange	PacketExchange	Paris
PaNAP	Paris Network Access Point	Paris
PARIX	Paris Internet Exchange	Paris
POUIX	POUIX	Paris
SFINX	Service for French INternet eXchange	Paris

Germany (14)

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 - Leipzig	European Commercial Internet Exchange	Leipzig
FraNAP	Frankfurt Network Access Point	Frankfurt
INXS	Internet Exchange Point in Munich	Munich
KleyRex	Kleyer Rebstocker EXchange	Frankfurt
MAE - Frankfurt	MAE - Frankfurt	Frankfurt
NDIX	Nederlands-Duitse Internet Exchange	Borghorst Emsdetten Greven Gronau Nordhorn Münster Steinfurt
N-IX	Nurnberger Internet eXchange	Nurnberg
PacketExchange	PacketExchange	Frankfurt
S-IX	Stuttgarter internet eXchange	Stuttgart
WORK-IX	WORK-IX	Hamburg

Greece (1)

AIX	Athens Internet Exchange	Athens

Hungary (1)

BIX	Budapest Internet eXchange	Budapest

Iceland (1)

RIX	Reykjavik Internet Exchange	Reykjavik

Ireland (2)

INEX	Internet Neutral EXchange	Dublin
PacketExchange	PacketExchange	Dublin

Italy (4)

MIX	Milan Internet eXchange	Milan
NaMeX	Nautilus Mediterranean Exchange Point	Rome
TIX Tuscany	Tuscany Internet eXchange	Florence
TOP-IX	Torino Piemonte Exchange Point	Alessandria Aosta Asti Biella Cuneo Ivrea Novara Pont Saint Martin Torino Verbania Vercelli

Latvia (1)

LIX	Latvian Internet eXchange	Riga

Luxembourg (1)

LIX	Luxembourg 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	Almelo Arnhem Deventer Doetinchem Ede Enschede Hardenberg Harderwijk Hengelo Oldenzaal
NL-IX	Netherlands Internet Exchange	Amsterdam
PacketExchange	PacketExchange	Amsterdam

Norway (2)

NIX1	Norwegian Internet eXchange	Oslo
NIX2	Norwegian Internet eXchange	Oslo

Poland (5)

KIX	Krakow Internet eXchange	Krakow
TIX	Tysiaclecie Internet eXchange	Tysiaclecie
PL-IX	Polish Internet Exchange	Warsaw Krakow Wroclaw
WIX	Warsaw Internet eXchange	Warsaw
WRIX	Wroclaw Internet eXchange	Wroclaw

Portugal (1)

GIGAPIX	GIGAbit Portuguese Internet eXchange	Lisbon

Romania (2)

BUHIX	Bucharest Internet Exchange	Bucharest
RoNIX	Romanian Network for Internet eXchange	Bucharest

Russia (8)

CHEL-PP	Chelyabinsk Peering Point	Chelyabinsk
KRS-IX	Krasnoyarsk Internet Exchange	Krasnoyarsk
MPIX	MPIX	Moscow
MSK-IX	Moscow Internet Exchange	Moscow
NSK-IX	Novosibirsk Internet eXchange	Novosibirsk
SAMARA-IX	SAMARA-IX	Samara
SIMIX	Simbirsk Internet Exchange	Ulyanovsk
SPB-IX	St.-Petersburg Internet eXchange	St.-Petersburg

Slovakia (2)

SIX	Slovak Internet eXchange	Bratislava
sitelix	Sitel Internet eXchange	Bratislava

Slovenia (1)

SIX	Slovenian Internet Exchange	Ljubljana

Spain (5)

CATNIX	Catalunya Neutral Internet Exchange	Barcelona
ESPANIX	Espana Internet Exchange	Madrid
EuskoNIX	Punto neutro Vasco de Internet	Bilboa
galNIX	Galicia Neutral Internet eXchange	Santiago
NOTA Madrid	Terremark: NAP de las Americas Madrid	Madrid

Sweden (10)

GIX	Gothenburg Internet Exchange	Gothenburg
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
SOLIX	SOLIX	Stockholm
STHIX	Stockholm Internet Exchange	Stockholm

Switzerland (3)

CIXP	CERN Internet Exchange Point	Geneva
Swissix	Swiss Internet Exchange	Zurich
TIX	Telehouse Internet Exchange	Zurich

Ukraine (1)

UA-IX	Ukrainian Internet Exchange	Kiev

United Kingdom (9)

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 Manchester
RBEIX	RBIEX	London
UK6x	UK IPv6 Internet Exchange	London

2.2 Number of IXPs per country

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 present
Germany	14
France	13
Sweden	10
United Kingdom	9
Russia	8
Netherlands	6
Poland	5
Spain	5
Italy	4
Belgium	3
Czech Republic	3
Switzerland	3
Estonia	2
Finland	2
Ireland	2
Norway	2
Romania	2
Slovakia	2
Austria	1
Croatia	1
Cyprus	1
Denmark	1
Greece	1
Hungary	1
Iceland	1
Latvia	1
Luxembourg	1
Malta	1
Portugal	1
Slovenia	1
Ukraine	1
31 Countries	

2.3 Total Number of IXPs per European City

City	Country	# IXPs
Paris	France	9
London	United Kingdom	7
Frankfurt	Germany	5
Amsterdam	Netherlands	3
Brussels	Belgium	3
Manchester	United Kingdom	3
Strasbourg	France	3
Berlin	Germany	2
Bucharest	Romania	2
Bratislava	Slovakia	2
Dublin	Ireland	2
Gothenburg	Sweden	2
Madrid	Spain	2
Malmoe	Sweden	2
Moscow	Russia	2
Oslo	Norway	2
Reykjavik	Iceland	2
Tallinn	Estonia	2
Warsaw	Poland	2
Zurich	Switzerland	2
Alessandria	Italy	1
Almelo	Netherlands	1
Aosta	Italy	1
Arnhem	Netherlands	1
Asti	Italy	1
Athens	Greece	1
Barcelona	Spain	1
Biella	Italy	1
Bilboa	Spain	1
Borghorst	Germany	1
Brno	Czech Republic	1
Budapest	Hungary	1
Chelyabinsk	Russia	1
Cuneo	Italy	1
Deventer	Netherlands	1
Doetinchem	Netherlands	1
Dusseldorf	Germany	1
Ede	Netherlands	1
Emsdetten	Germany	1
Enschede	Netherlands	1
Florence	Italy	1
Gavle	Sweden	1
Geneva	Switzerland	1
Greven	Germany	1
Gronau	Germany	1
Groningen	Netherlands	1
Hamburg	Germany	1
Hardenburg	Netherlands	1
Harderwijk	Netherlands	1
Helsinki	Finland	1
Hengelo	Netherlands	1
Ivrea	Italy	1
Kiev	Ukraine	1
Krakow	Poland	1
Krasnoyarsk	Russia	1
Leeuwarden	Netherlands	1
Leipzig	Germany	1
Lisbon	Portugal	1
Ljubljana	Slovenia	1
Lulea	Sweden	1
Luxembourg	Luxembourg	1
Lyngby	Denmark	1
Lyon	France	1
Marseille	France	1
Milan	Italy	1
Msida	Malta	1
Munich	Germany	1
Münster	Germany	1
Nicosia	Cyprus	1
Nordhorn	Germany	1
Novara	Italy	1
Novosibirsk	Russia	1
Nurnberg	Germany	1
Oldenzaal	Netherlands	1
Pont St. Martin	Italy	1
Prague	Czech Republic	1
Riga	Latvia	1
Rome	Italy	1
Samara	Russia	1
Santiago	Spain	1
St.-Petersburg	Russia	1
Steinfurt	Germany	1
Stockholm	Sweden	1
Stuttgart	Germany	1
Sundsvall	Sweden	1
Tampere	Finland	1
Torino	Italy	1
Tysiaclecie	Poland	1
Ulyanovsk	Russia	1
Umea	Sweden	1
Verbania	Italy	1
Vercelli	Italy	1
Vienna	Austria	1
Wroclaw	Poland	1
Zagreb	Croatia	1
96	**31**	

Section 3. European IXP growth since 1992

3.1 IXP growth in Europe since 1992

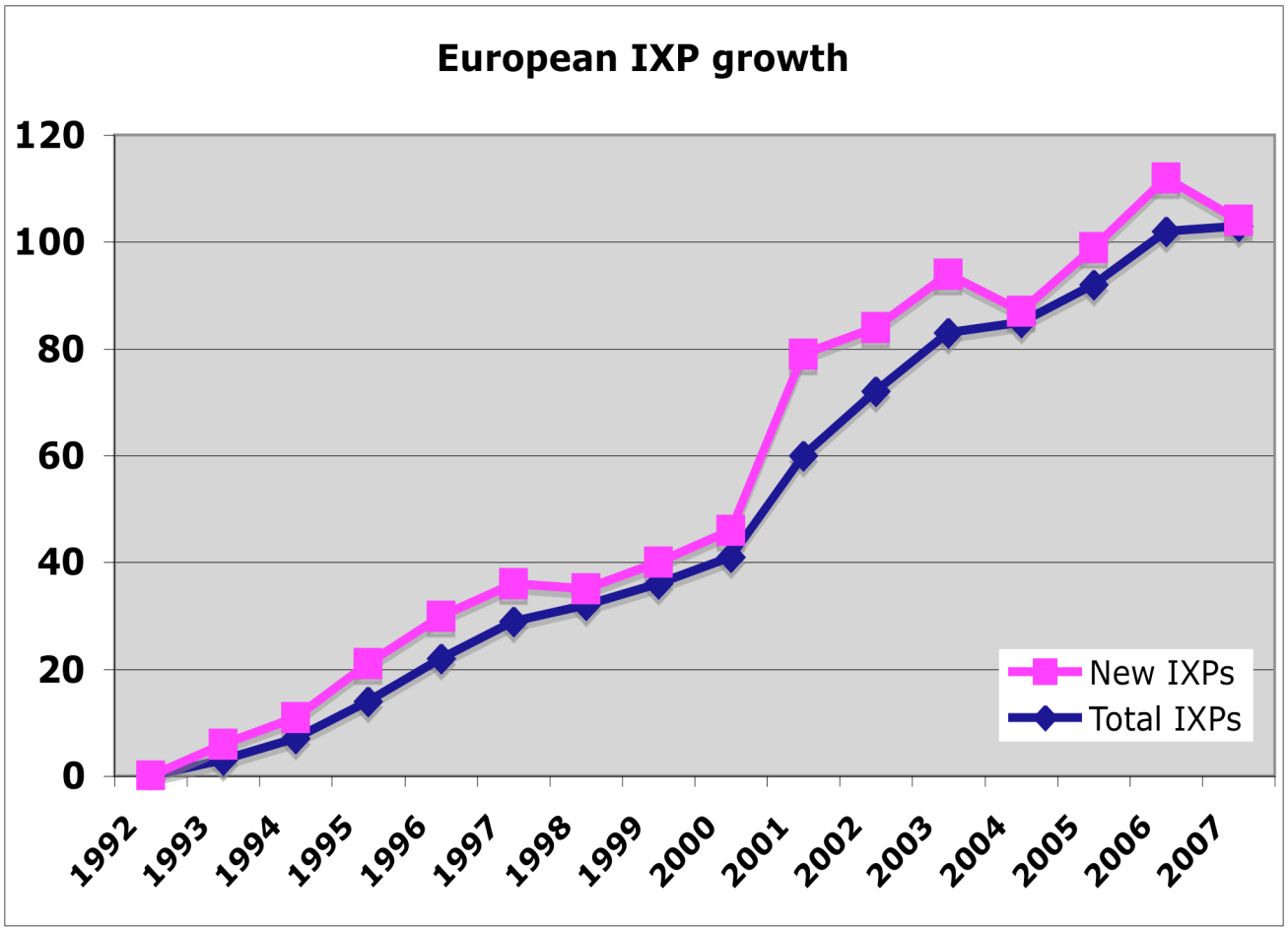
This table details the 'official' establishment dates of both non-profit and commercial IXPs in Europe since 1992. In some cases the IXP may have been 'unofficially' established (i.e. actually operating without any legal entity being established) early than some of the dates used in this table, however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

Year	New IXPs	New NP	Total NP	NP as % of all	New comm.	Total comm.	Comm as % of all	Total IXPs
1992	0	0	0	0%	0	0	0%	**0**
1993	3	3	3	100%	0	0	0%	**3**
1994	4	3	6	86%	1	1	14%	**7**
1995	7	6	12	86%	1	2	14%	**14**
1996	8	7	19	86%	1	3	14%	**22**
1997	7	7	26	90%	0	3	10%	**29**
1998	3	3	29	91%	0	3	9%	**32**
1999	4	3	32	89%	1	4	11%	**36**
2000	5	4	36	88%	1	5	12%	**41**
2001	19	13	49	82%	6	11	18%	**60**
2002	12	7	56	78%	5	16	22%	**72**
2003	11	6	62	75%	5	21	25%	**83**
2004	2	0	62	73%	2	23	27%	**85**
2005	6	2	64	70%	5	28	30%	**92**
2006	10	5	69	68%	5	33	32%	**102**
2007	1	0	69	67%	1	34	33%	**103**

NP = Non profit IXP
Comm = commercial or for profit IXP

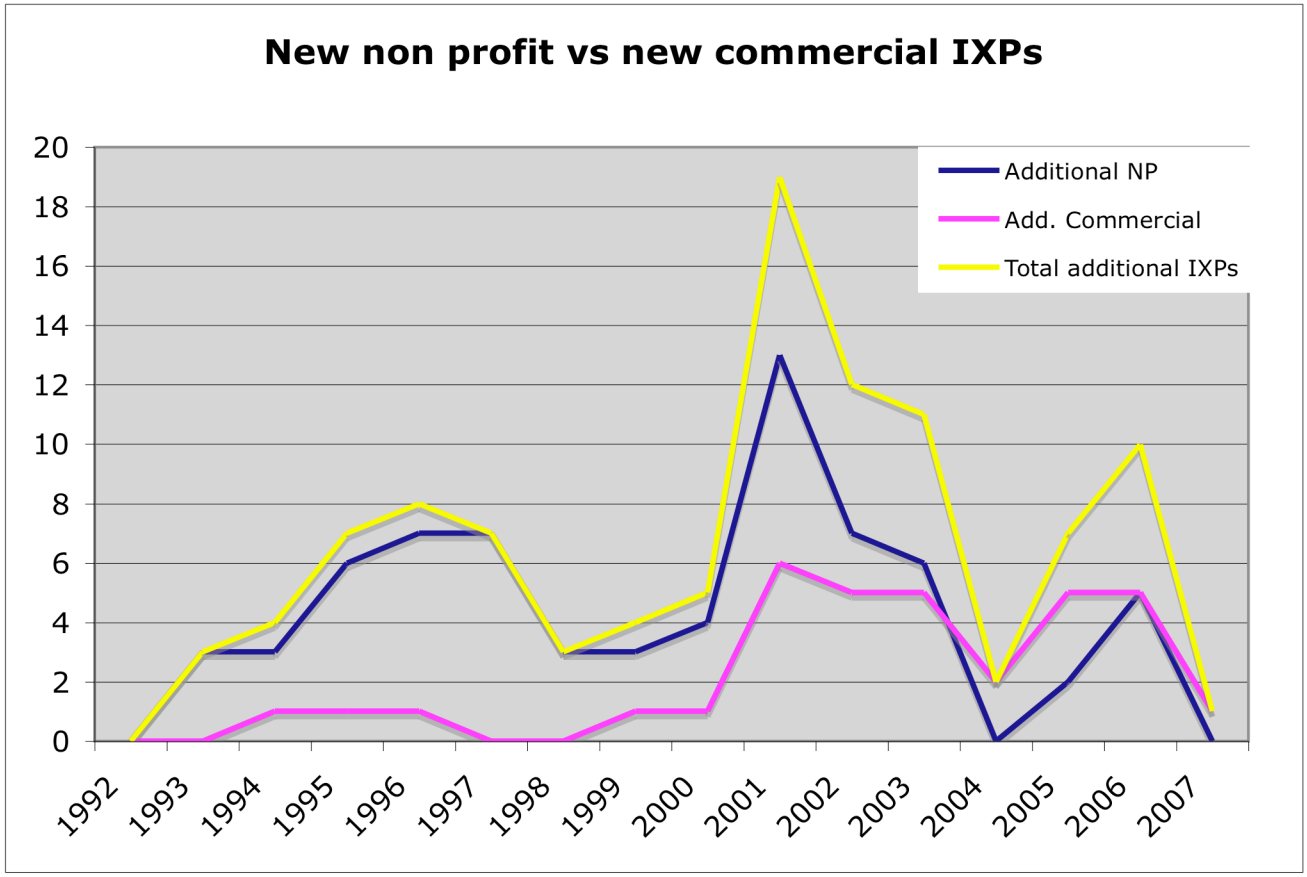
3.2 Additional and total IXP growth per year

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. 2006 also saw the establishment of some 10 IXPs which would suggest that the growth rate is healthily increasing.



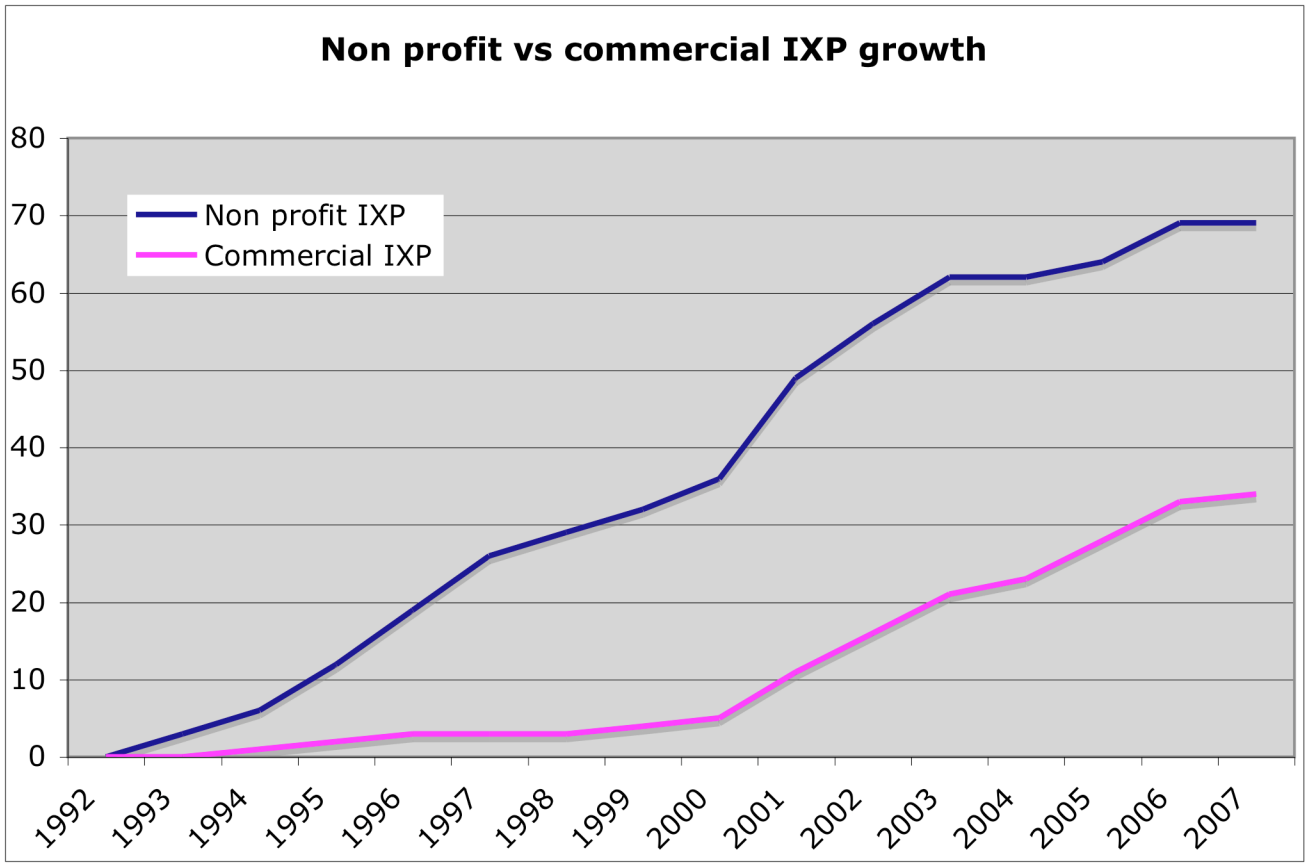
3.3 Additional IXPs per year (Non profit vs. Commercial)

The graph details the establishment of additional IXPs, both non-profit and commercial, in relation to total IXP growth since 1992. One can see that it wasn't until around 2001 that the commercial IXPs started making a real presence on the European IXP scene, in fact in the last 5 years almost the same amount of non profit as commercial IXPs have been established.



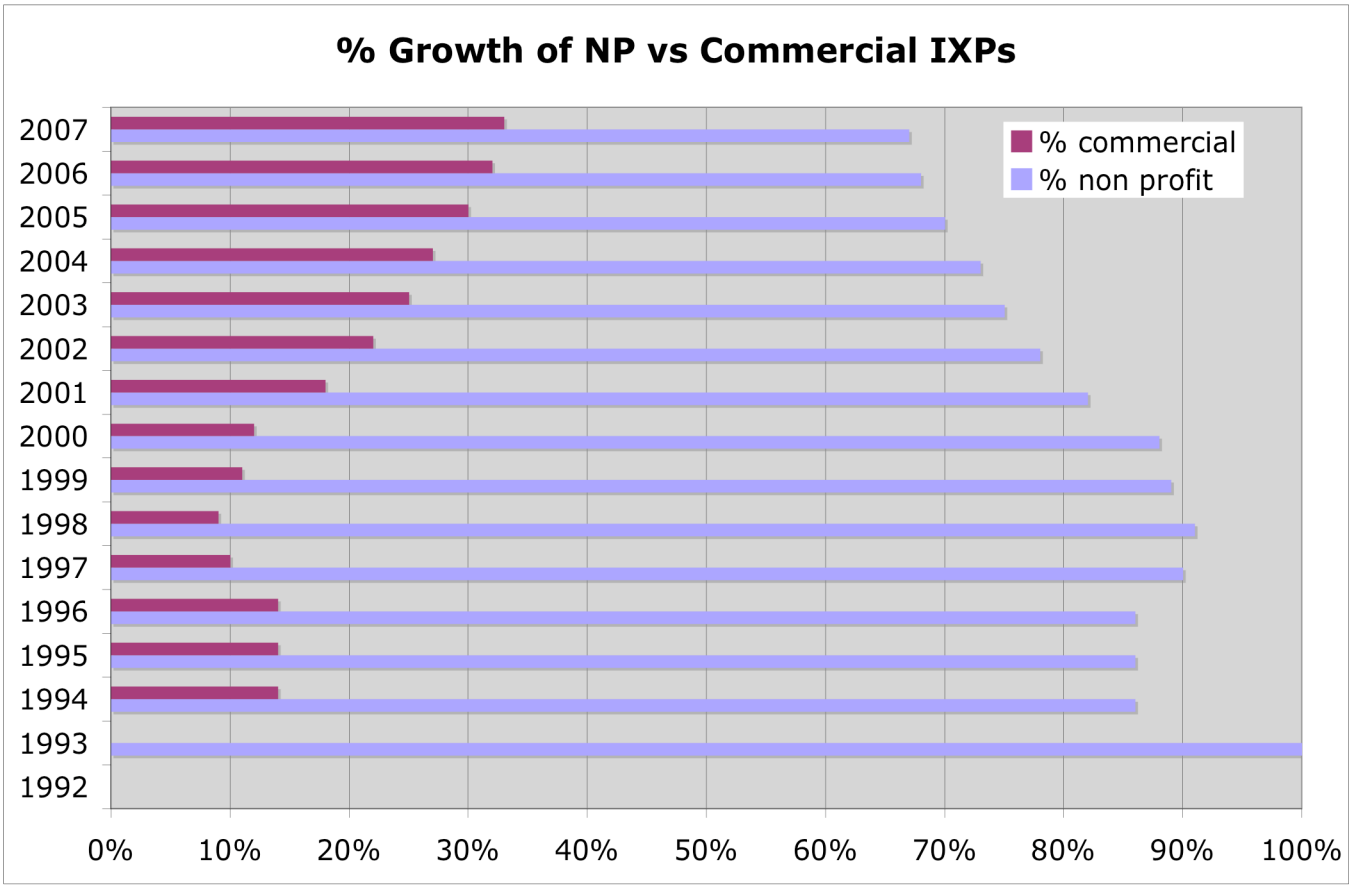
3.4 Overall growth of IXPs (non-profit vs. commercial)

This graph shows non-profit versus commercial IXP growth in Europe since 1992.



3.5 Percentage growth of IXPs per year (Non profit vs. Commercial)

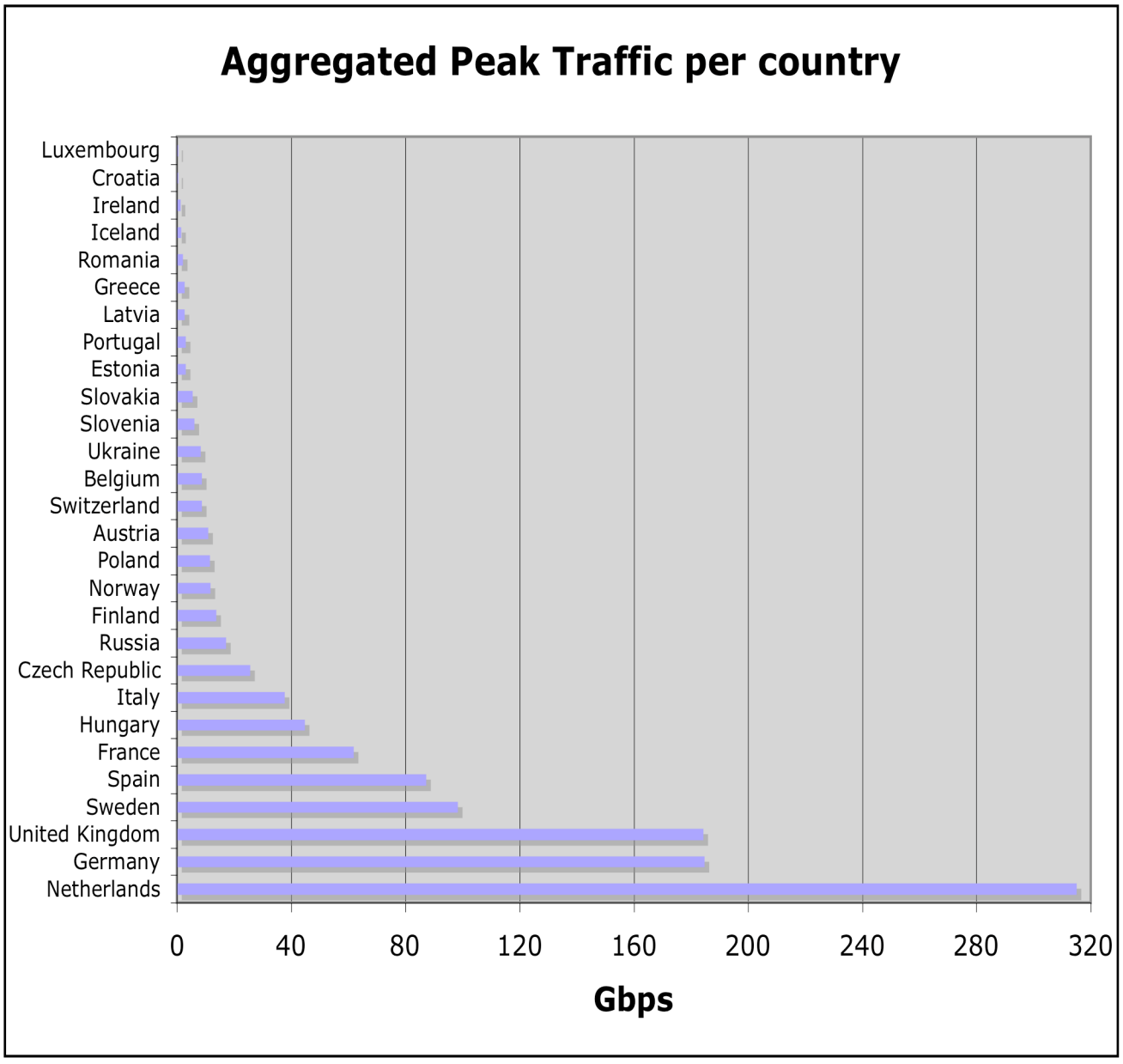
This graph details the growth of both non-profit and commercial IXPs in Europe in relation to the overall amount of IXPs in Europe.



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 Interconnected traffic that doesn't not pass over the public peering infrastructure.



Note: This traffic data was captured on the 29th of August 2007.

4.2 IXP traffic per country

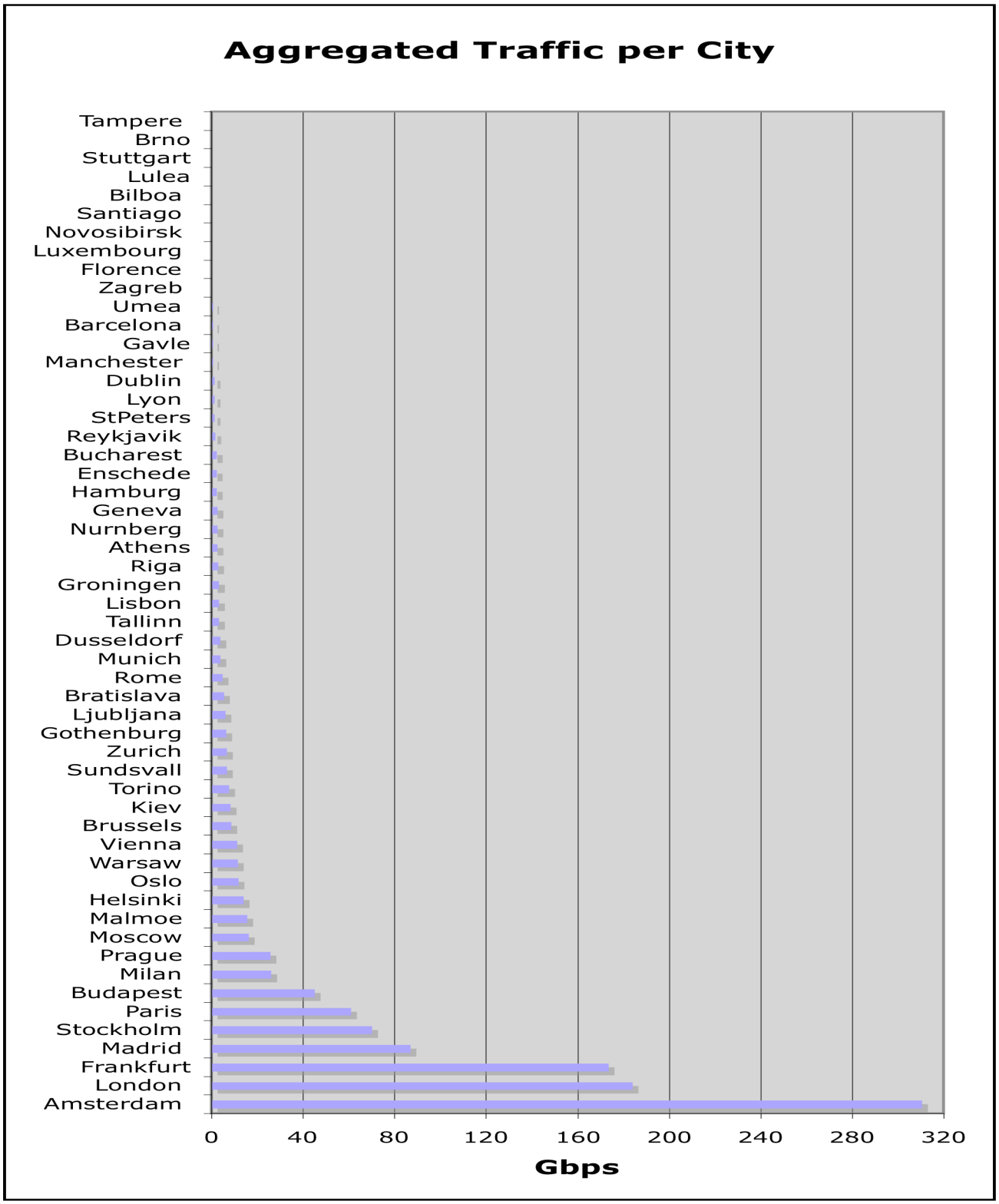
This table details the amount of peak aggregated traffic per country and further shows what percentage the country's traffic is compared to Europe has a whole.

Country	Gbps	% of total
Austria	10,760	0,93%
Belgium	8,400	0,74%
Croatia	0,131	0,01%
Czech Republic	25,303	2,19%
Estonia	2,920	0,26%
Finland	13,509	1,17%
France	61,563	5,34%
Germany	184,444	16,01%
Greece	2,350	0,21%
Hungary	44,600	3,87%
Iceland	1,200	0,01%
Ireland	0,920	0,01%
Italy	37,425	3,34%
Latvia	2,500	0,22%
Luxembourg	0,106	0,01%
Netherlands	314,733	27,32%
Norway	11,400	0,99%
Poland	11,230	0,97%
Portugal	2,845	0,25%
Romania	1,840	0,16%
Russia	17,009	1,48%
Slovakia	5,160	0,46%
Slovenia	5,800	0,52%
Spain	86,964	7,55%
Sweden	98,147	8,52%
Switzerland	8,410	0,75%
Ukraine	8,030	0,72%
United Kingdom	184,123	15,99%
Total	**1151,822**	**100,00%**

Note: This traffic data was captured on the 29th of August 2007

4.3 Peak aggregated traffic per city

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



Note: This traffic data was captured on the 29th of August 2007

4.4 IXP traffic per city (A - L)

This table details the total amount of peak aggregated traffic per European city and further shows what percentage the city's IXP traffic is compared to Europe's IXP traffic as a whole.

City	Country	Traffic Gbps	% of total
Amsterdam	Netherlands	310,055	26,92%
Athens	Greece	2,350	0,20%
Barcelona	Spain	0,350	0,03%
Bilboa	Spain	0,050	0,01%
Bratislava	Slovakia	5,128	0,46%
Brno	Czech Republic	0,020	0,00%
Brussels	Belgium	8,400	0,73%
Bucharest	Romania	1,840	0,16%
Budapest	Hungary	44,600	3,87%
Dublin	Ireland	0,920	0,08%
Dusseldorf	Germany	3,570	0,31%
Enschede	Netherlands	2,000	0,17%
Florence	Italy	0,130	0,01%
Frankfurt	Germany	173,029	15,02%
Gavle	Sweden	0,394	0,03%
Geneva	Switzerland	2,100	0,18%
Gothenburg	Sweden	6,055	0,53%
Groningen	Netherlands	2,710	0,24%
Hamburg	Germany	2,000	0,17%
Helsinki	Finland	13,507	1,17%
Kiev	Ukraine	8,030	0,70%
Lisbon	Portugal	2,845	0,25%
Ljubljana	Slovenia	5,800	0,50%
London	United Kingdom	183,723	15,95%
Lulea	Sweden	0,026	0,01%
Luxembourg	Luxembourg	0,106	0,01%
Lyon	France	1,000	0,09%

Note: This traffic data was captured on the 29th of August 2007

4.5 IXP traffic per city (M - Z)

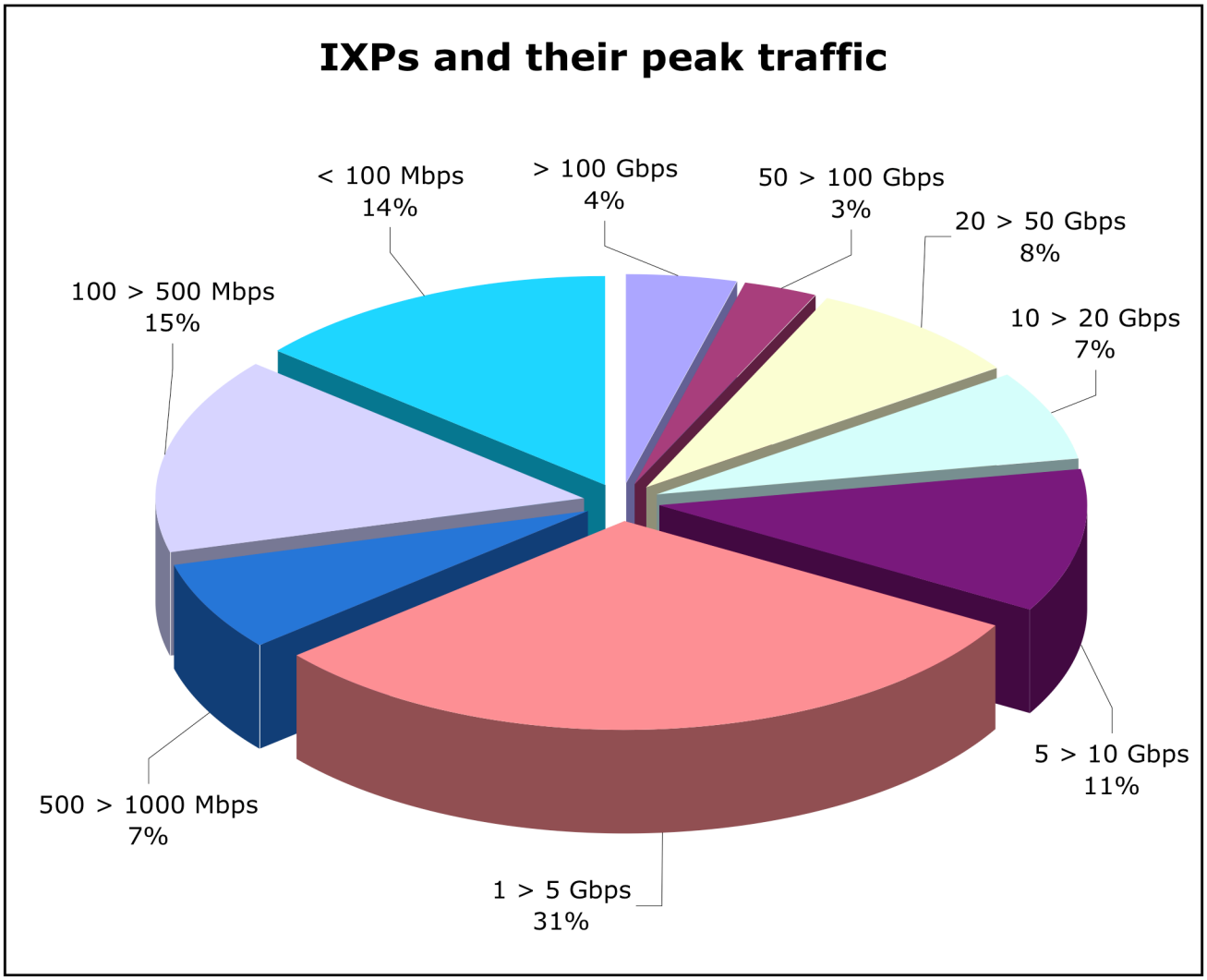
This table details the amount of peak aggregated traffic per European city and further shows what percentage the city's traffic is compared to Europe as a whole.

City	Country	Traffic Gbps	% of total
Madrid	Spain	86,500	7,51%
Malmoe	Sweden	15,129	1,31%
Manchester	United Kingdom	0,400	0,03%
Milan	Italy	25,704	2,23%
Moscow	Russia	15,939	1,38%
Munich	Germany	3,600	0,31%
Novosibirsk	Russia	0,070	0,01%
Nurnberg	Germany	2,220	0,19%
Oslo	Norway	11,400	0,99%
Paris	France	60,563	5,26%
Prague	Czech Republic	25,283	2,19%
Reykjavik	Iceland	1,200	0,10%
Riga	Latvia	2,500	0,22%
Rome	Italy	4,391	0,38%
Santiago	Spain	0,064	0,01%
Stockholm	Sweden	69,829	6,06%
StPeters	Russia	1,000	0,09%
Stuttgart	Germany	0,025	0,01%
Sundsvall	Sweden	6,464	0,56%
Tallinn	Estonia	2,920	0,25%
Tampere	Finland	0,002	0,00%
Torino	Italy	7,200	0,63%
Umea	Sweden	0,250	0,02%
Vienna	Austria	10,760	0,93%
Warsaw	Poland	11,230	0,97%
Zagreb	Croatia	0,131	0,01%
Zurich	Switzerland	6,310	0,55%
		1151,822	**100,00%**

Note: This traffic data was captured on the 29th of August 2007

4.6 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 traffic statistics could only be gathered from 72 of the 103 European IXPs, these percentages are therefore based on these 72 IXPs.

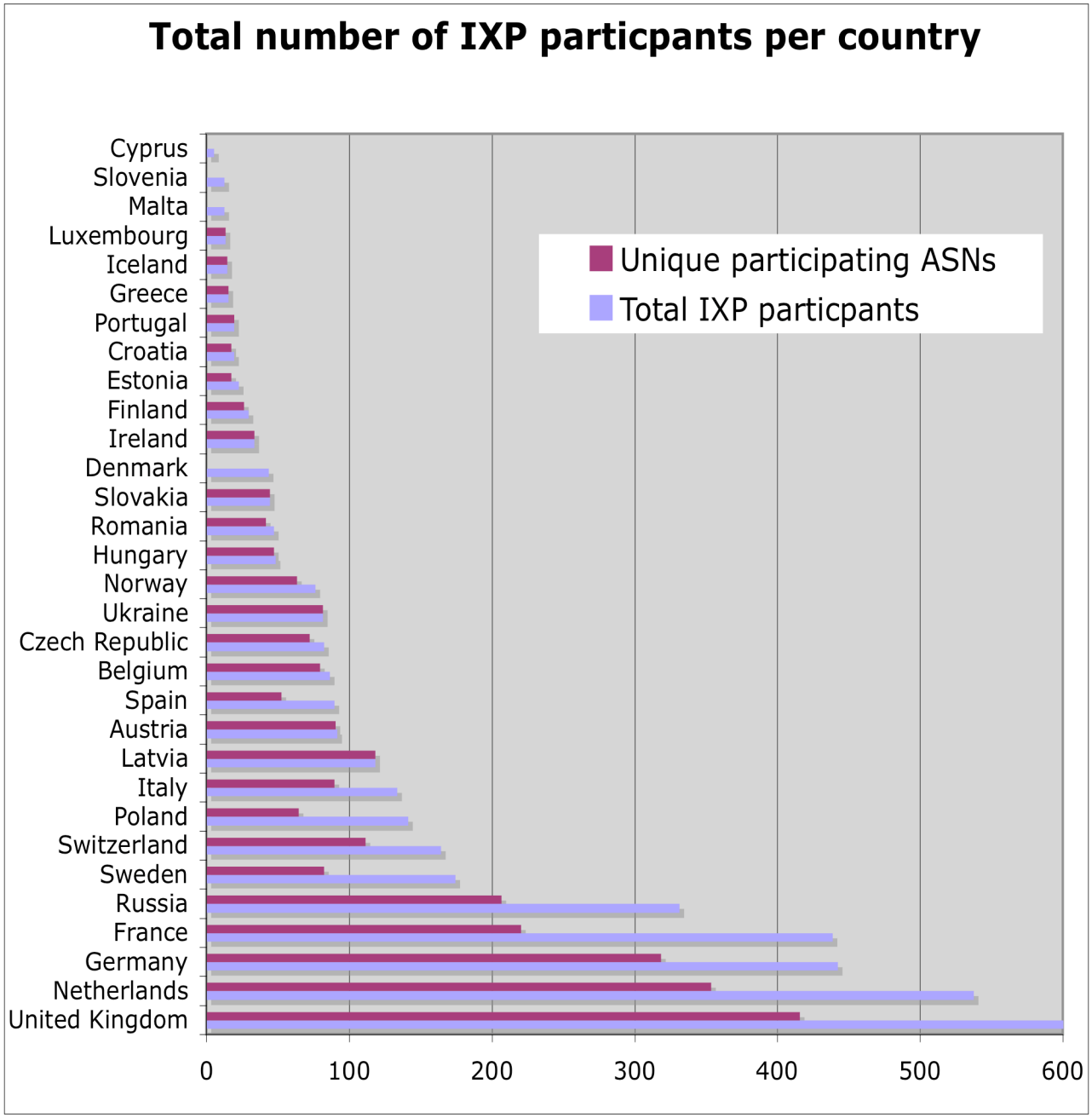


Peak traffic	# of IXPs	% of total
> 100 Gbps	3	4%
50 > 100 Gbps	2	3%
20 > 50 Gbps	6	8%
10 > 20 Gbps	5	7%
5 > 10 Gbps	8	11%
1 > 5 Gbps	22	31%
500 > 1000 Mbps	5	7%
100 > 500 Mbps	11	15%
< 100 Mbps	10	14%
Total	72	100%

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 county 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 29th of August 2007

5.2 Total number of IXP participants per country

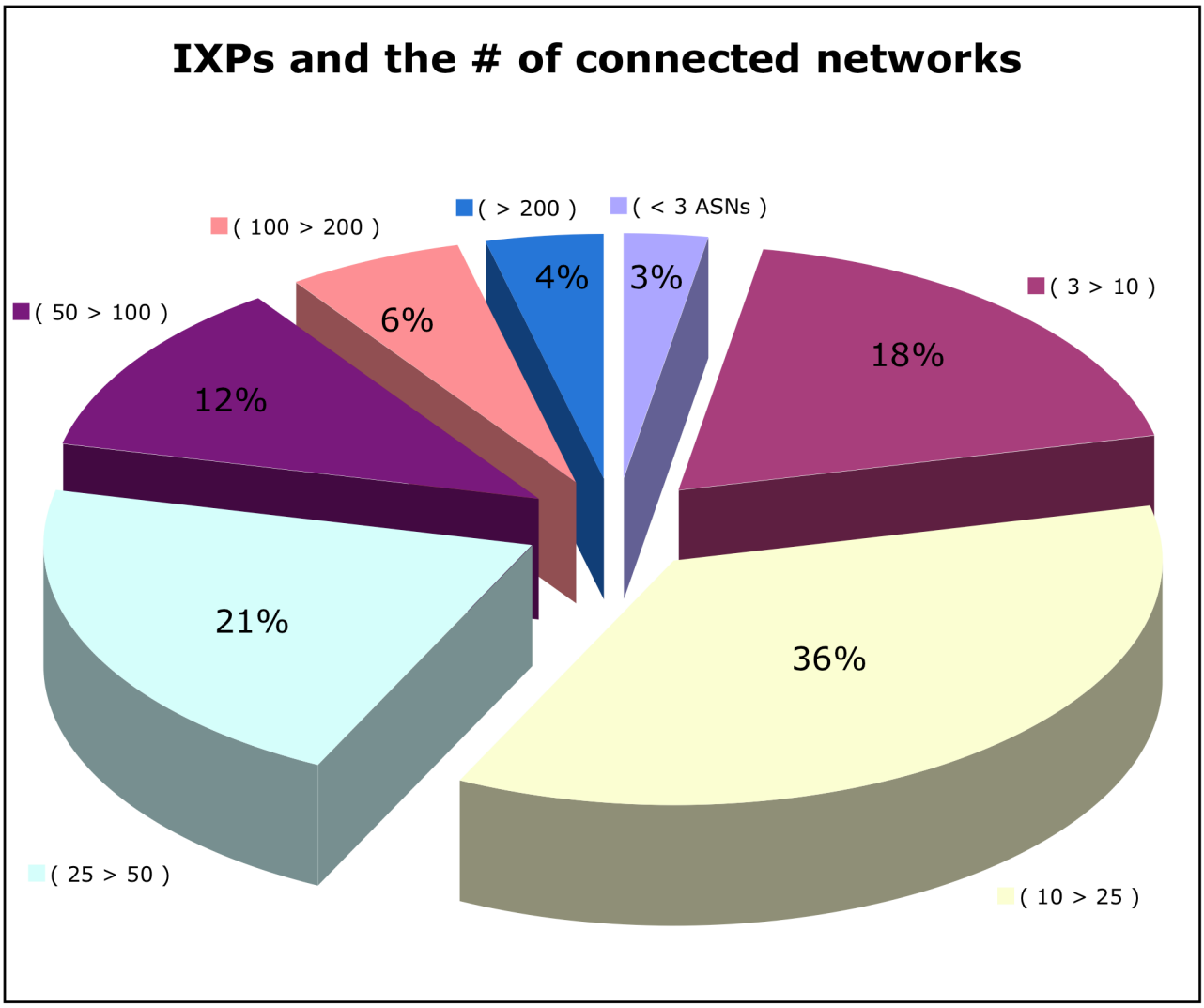
This table details:

a. 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.
b. Total number of listed or published ASNs per country. In some circumstances IXP participants to not wish to publicly advertise their ASN at a particular IXP or the IXP does not publish a list of their participant's ASNs.
c. 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)
Austria	91	90	90
Belgium	86	86	79
Croatia	19	17	17
Cyprus	5	0	0
Czech Republic	82	76	72
Denmark	43	0	0
Estonia	22	22	17
Finland	29	29	26
France	438	409	220
Germany	442	429	318
Greece	15	15	15
Hungary	48	47	47
Iceland	14	14	14
Ireland	33	33	33
Italy	133	119	89
Latvia	118	118	118
Luxembourg	13	13	13
Malta	12	0	0
Netherlands	537	450	353
Norway	76	76	63
Poland	141	68	64
Portugal	19	19	19
Romania	47	47	41
Russia	331	208	206
Slovakia	44	44	44
Slovenia	12	0	0
Spain	89	67	52
Sweden	174	154	82
Switzerland	164	161	111
Ukraine	81	81	81
United Kingdom	601	566	415
Totals	**3959**	**3458**	**2699**
Total Unique ASNs peering at IXPs in Europe			**2105**

5.3 Percentage of IXPs and their number of participants

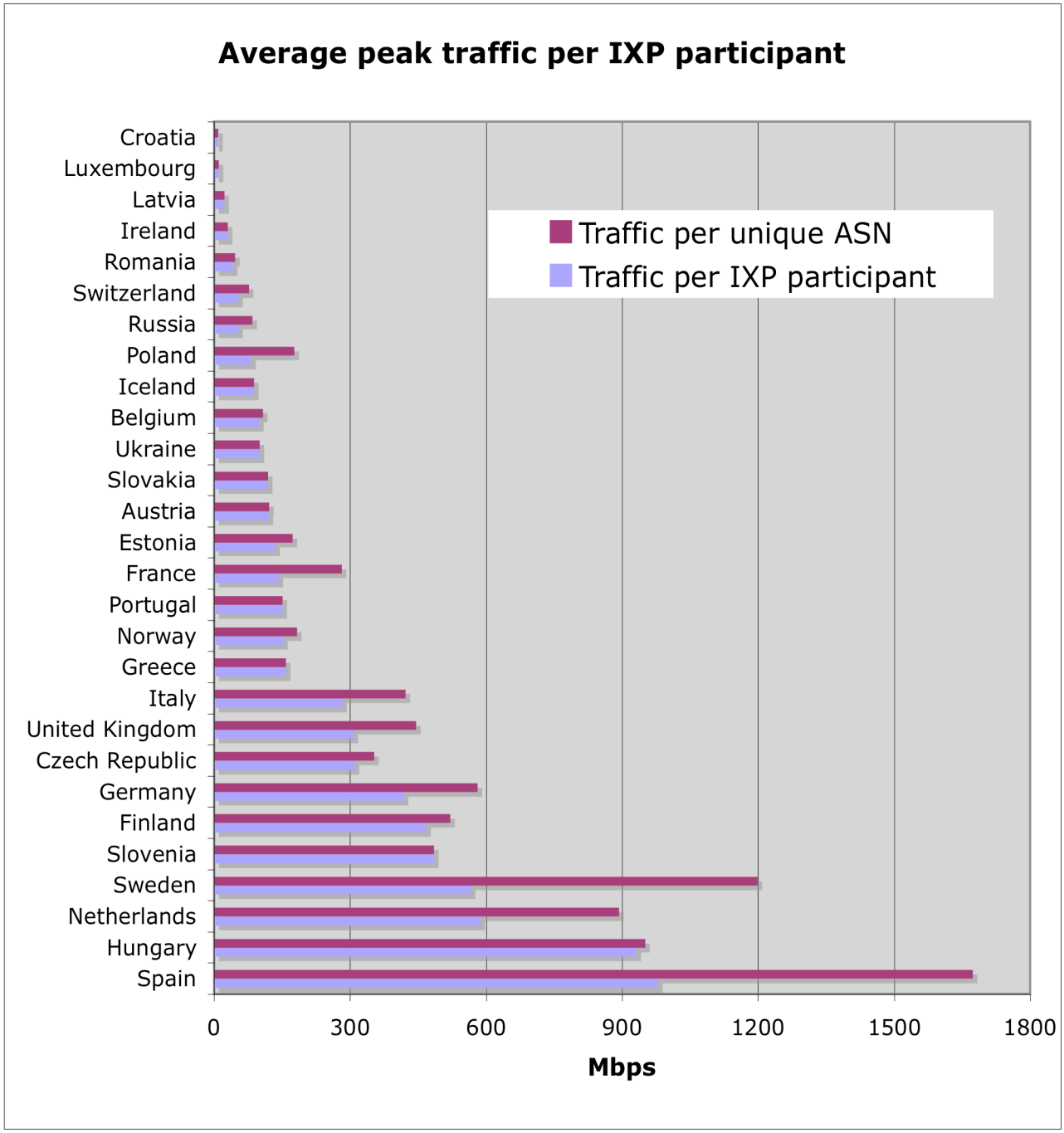
This graph highlights the percentage of European IXPs having a particular amount of participants at their exchange.



# of ASNs	# of IXPs	% of total
(< 3 ASNs)	3	2,9%
(3 > 10)	19	18,5%
(10 > 25)	37	35,9%
(25 > 50)	22	21,4%
(50 > 100)	12	11,7%
(100 > 200)	6	5,8%
(> 200)	4	3,9%
	103	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 then further displays the amount average amount of peak traffic per unique IXP participant.



Note: This traffic data was captured on the 29th of August 2007

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 a country. While the traffic per unique ASN has been derived by diving the total amount of unique ASNs peering in a country by the total amount of IXP traffic in a given country.

The average Euro-IX IXP participant has 295 Mbps of peak traffic. While the average traffic for a unique ASN peering at an European IXP is 547 Mbps.

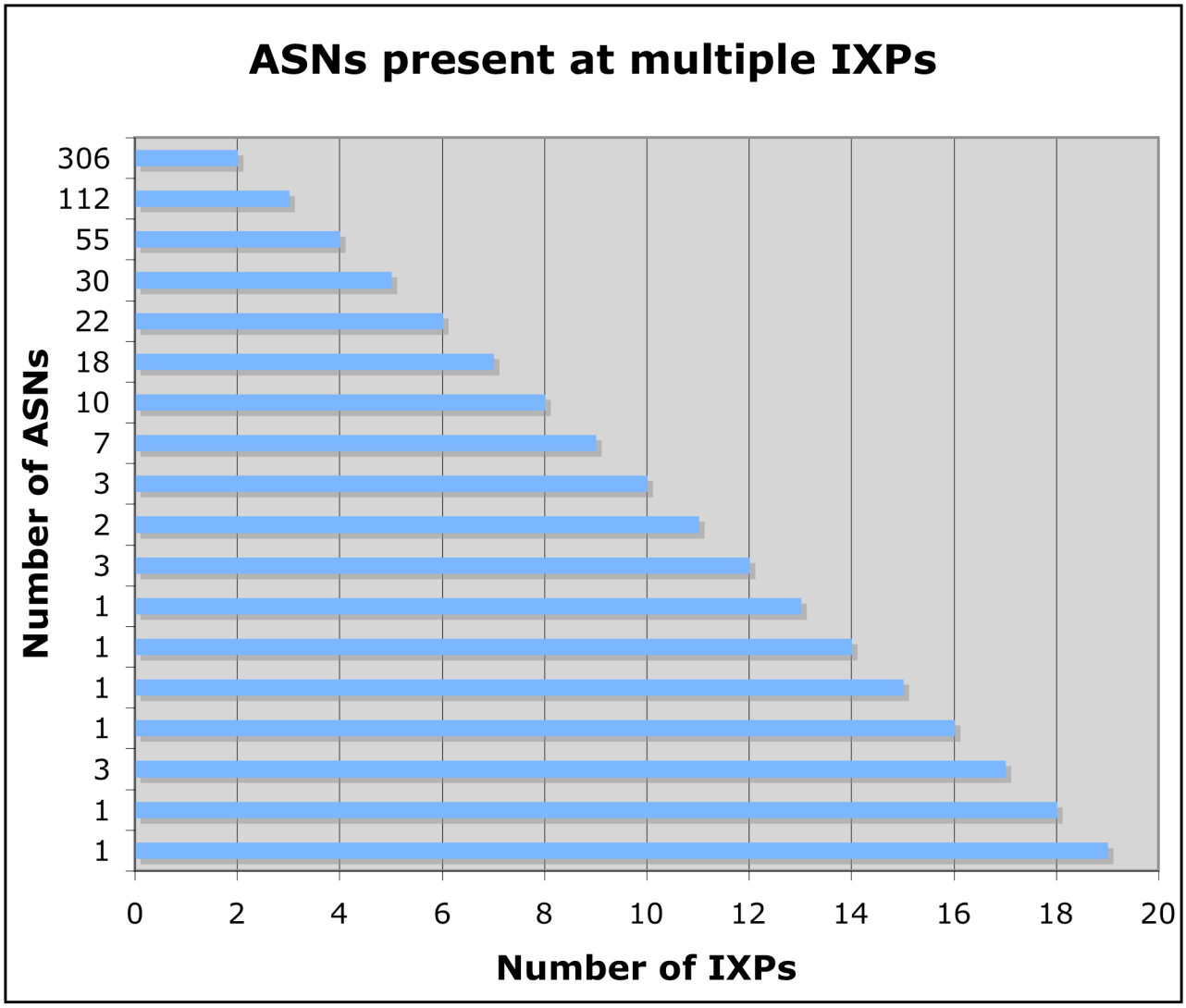
Country	Traffic in Gbps	Participants	Traffic per particpant in Mbps	Unique ASNs	Traffic per unique ASN in Mbps
Austria	10,760	91	**118,242**	90	119,556
Belgium	8,400	86	**97,674**	79	106,329
Croatia	0,131	19	**6,895**	17	7,706
Czech Republic	25,303	82	**308,573**	72	351,431
Estonia	2,920	22	**132,727**	17	171,765
Finland	13,509	29	**465,828**	26	519,577
France	61,563	438	**140,555**	220	279,832
Germany	184,444	442	**417,294**	318	580,013
Greece	2,350	15	**156,667**	15	156,667
Hungary	44,600	48	**929,167**	47	948,936
Iceland	1,200	14	**85,714**	14	85,714
Ireland	0,920	33	**27,879**	33	27,879
Italy	37,425	133	**281,391**	89	420,506
Latvia	2,500	118	**21,186**	118	21,186
Luxembourg	0,106	13	**8,154**	13	8,154
Netherlands	314,733	537	**586,095**	353	891,595
Norway	11,400	76	**150,000**	63	180,952
Poland	11,230	141	**79,645**	64	175,469
Portugal	2,845	19	**149,737**	19	149,737
Romania	1,840	47	**39,149**	41	44,878
Russia	17,009	331	**51,387**	206	82,568
Slovakia	5,160	44	**117,273**	44	117,273
Slovenia	5,800	12	**483,333**	12	483,333
Spain	86,964	89	**977,124**	52	1672,385
Sweden	98,147	174	**564,063**	82	1196,915
Switzerland	8,410	164	**51,280**	111	75,766
Ukraine	8,030	81	**99,136**	81	99,136
United Kingdom	184,123	601	**306,361**	415	443,669
Europe	**1151,822**	**3899**	**295,415**	**2105**	**547,184**

Note: This traffic data was captured on the 29th of August 2007

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

The graph below details the number of ASNs that are present at more than one European IXP. Starting from the top the graph shows that 306 ASNs peer at two IXPs while the bottom of the graph shows that one ASN peers at 19 European IXPs.

In total some 577 ASNs peer at more than one European IXP.



Note: This data was captured on the 29th of August 2007

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 17 participants that peer at 10 or more European IXPs.

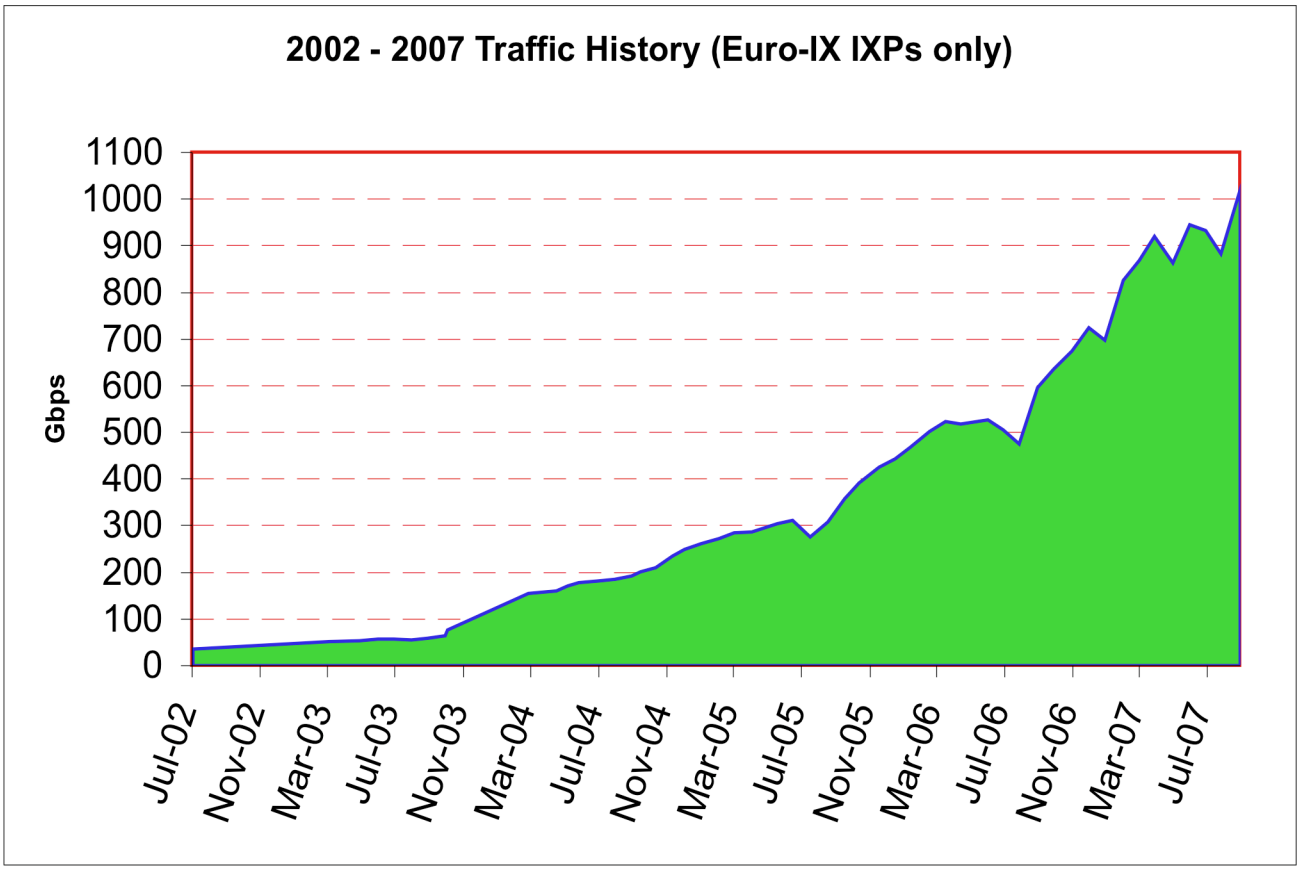
# of IXPs	# of ASNs	ASN
19	1	8220
18	1	2686
17	3	174, 702, 4589
16	1	8928
15	1	6830
14	1	1257
13	1	286
12	3	3303, 13237, 20940
11	2	5400, 13030
10	3	3257, 6774, 33970
9	7	-
8	10	-
7	18	-
6	22	-
5	30	-
4	55	-
3	112	-
2	306	-
Total ASNs at > 1 IXP		**577**

Note: This data was captured on the 29th of August 2007

Section 6. European IXP aggregated peak traffic trends

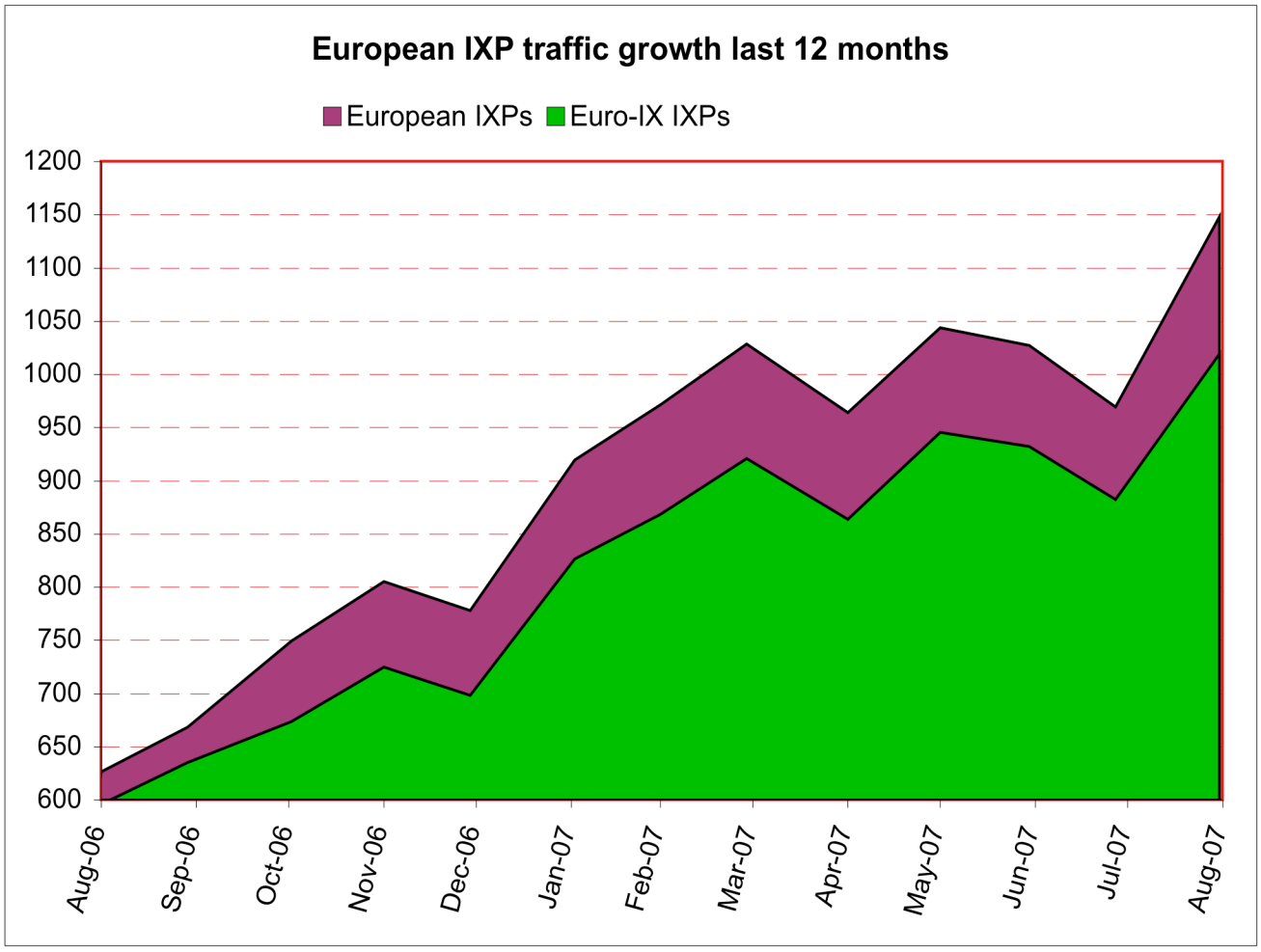
6.1 Aggregated peak traffic history 2002 - 2007

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 27 IXPs across Europe.



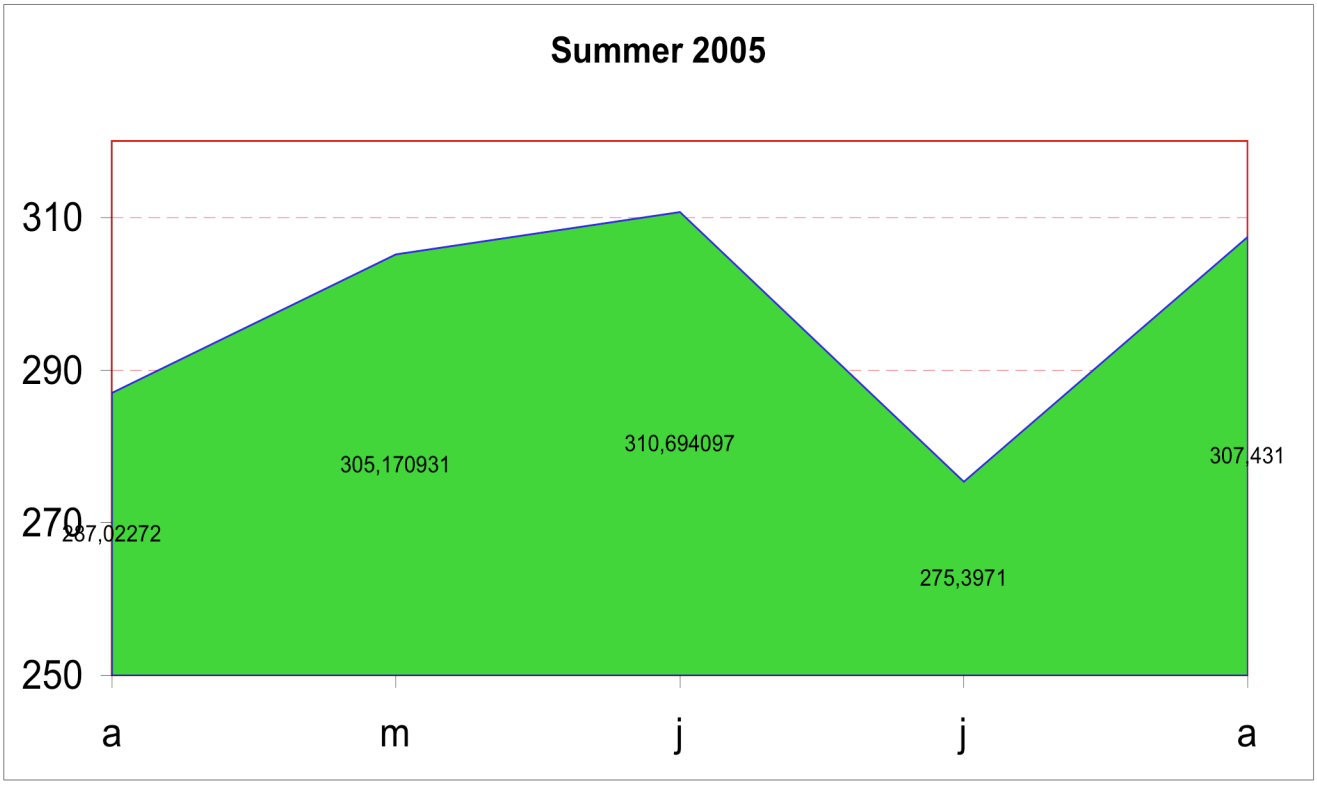
6.2 European traffic growth over the last 12 months

The growth below shows the aggregated peak traffic of the 27 Euro-IX member IXPs that have public traffic statistics as well another 26 European IXPs. On the 29th of August 2007 the aggregated peak traffic of all 53 IXPs that have publicly viewable statistics came to 1.148 Tbps.



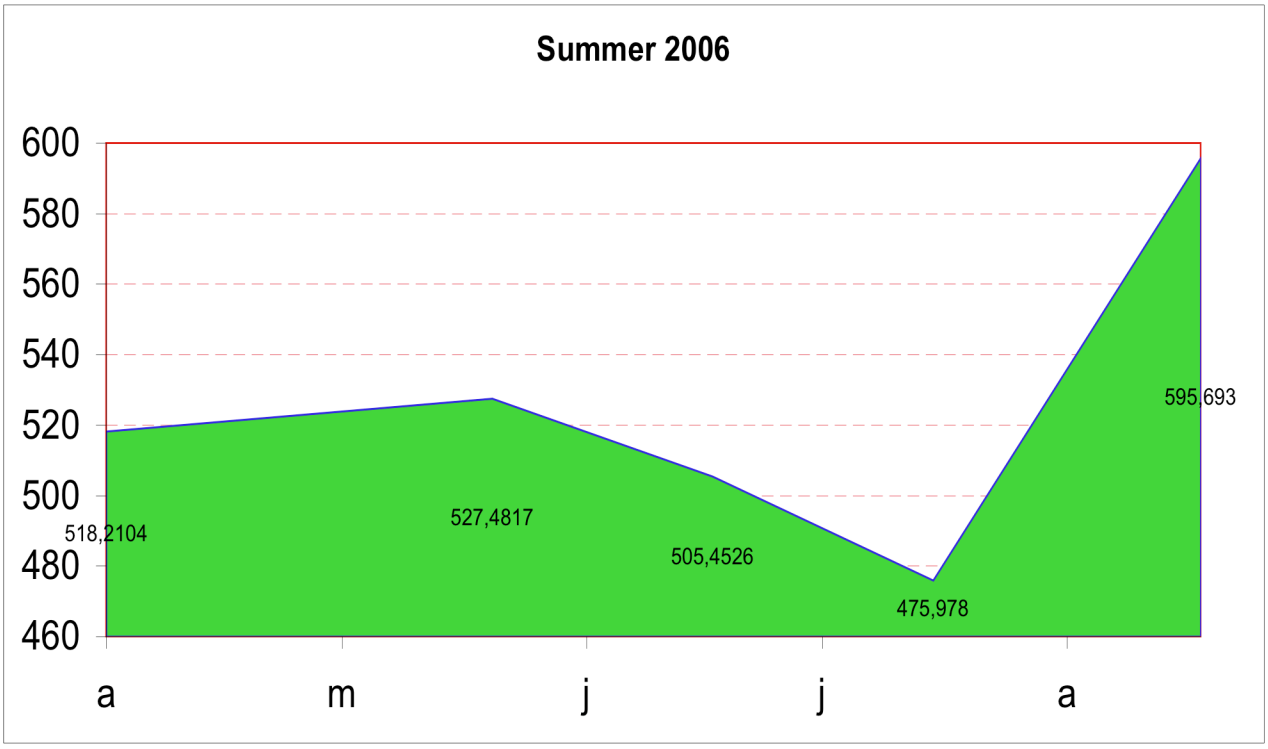
6.3 Summer peak traffic trend in Europe: 2005

This graph displays the aggregated IXP peak traffic during the summer of 2005. A decrease of some 11.4% in peak aggregated traffic was recorded between the months of June and July of that year.



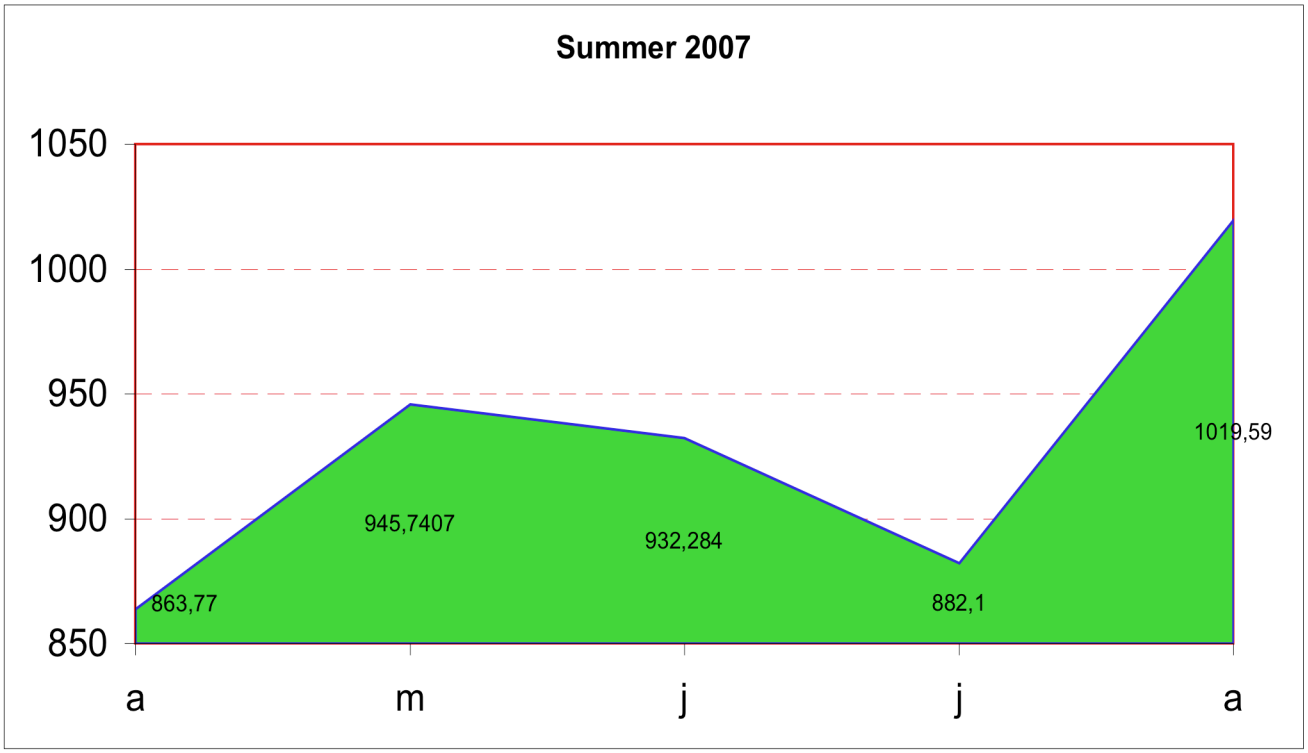
6.4 Summer peak traffic trend in Europe: 2006

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 July to August increase was over 25% in 2006.



6.5 Summer peak traffic trend in Europe: 2007

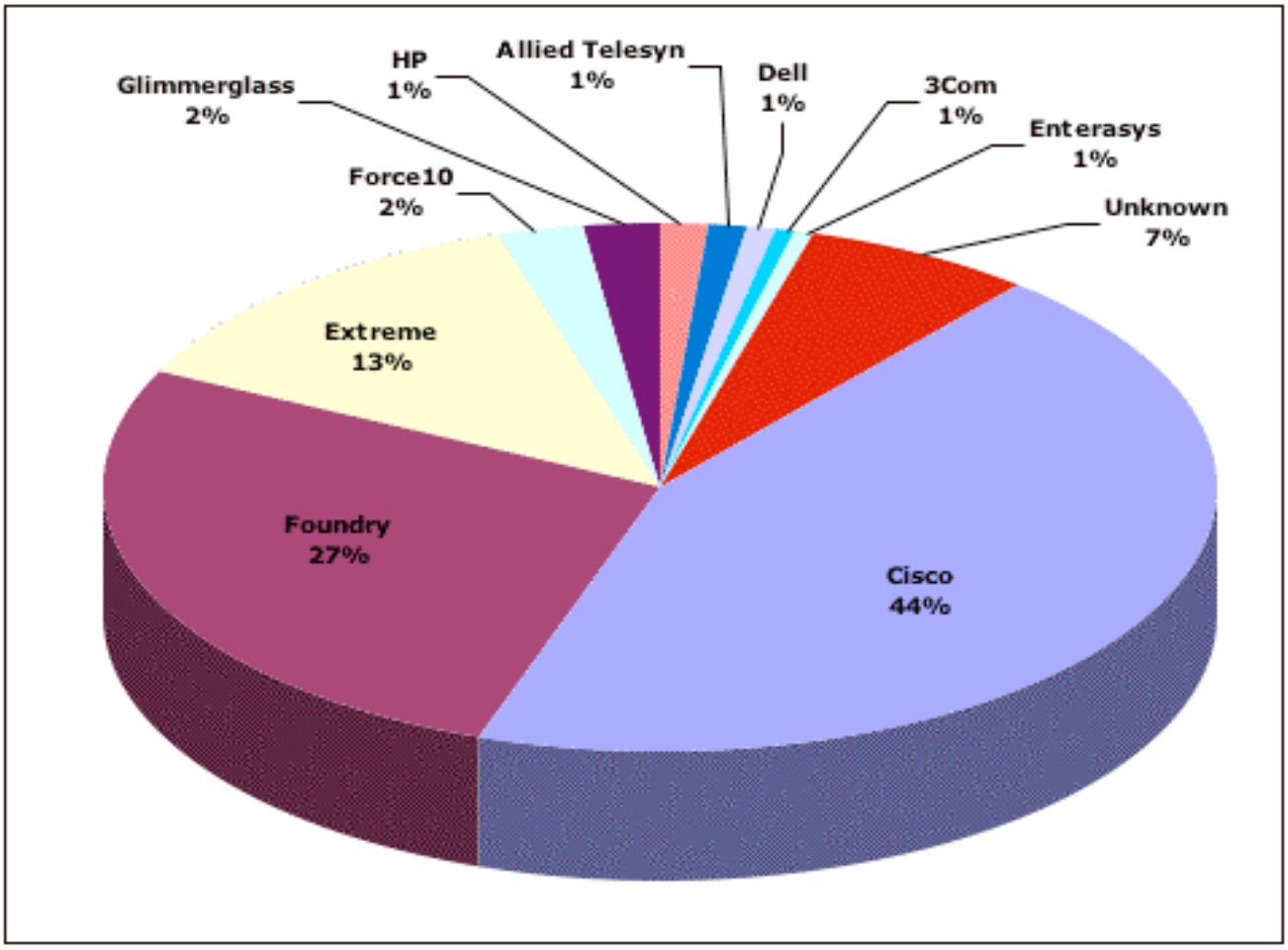
This graph displays the aggregated IXP peak traffic during the summer of 2007. Drops in monthly peak traffic can be seen as early as April, this is widely agreed by IXPs across Europe that it was due to the unusually early warm weather that was experienced for about four weeks across the continent. After 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.



Section 7. IXP switching platform technology

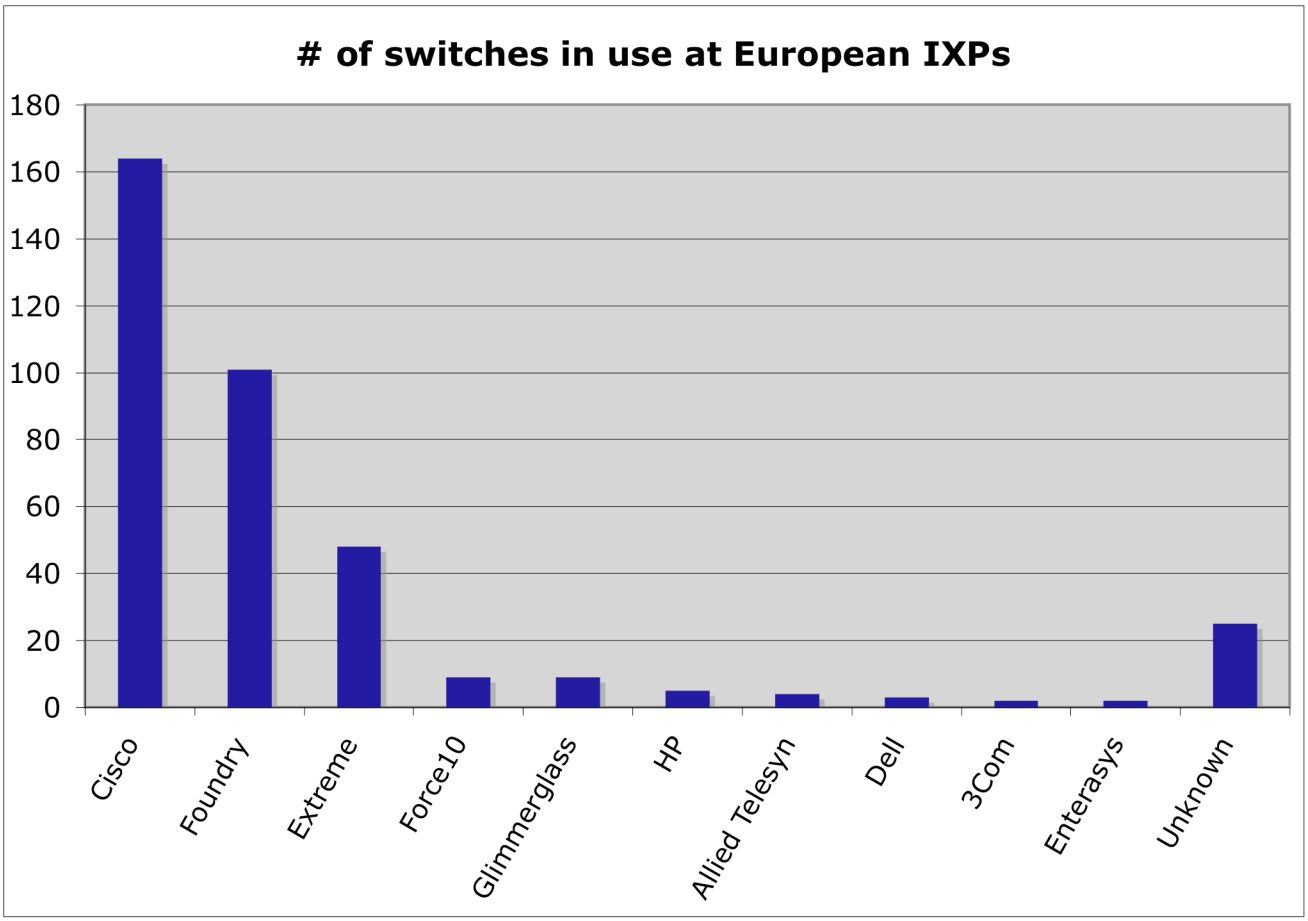
7.1 Percentage of switches being used at IXPs

This graph outlines the percentage of a particular vendor's switches that are being used by the 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.



7.2 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. The 'unknown' switches relates to the fact that Euro-IX was unable to collect accurate information on the brand of these switches.

Switch vendor	# of Switches	% of total
Cisco	164	44%
Foundry	101	27%
Extreme	48	13%
Force10	9	2%
Glimmerglass	9	2%
HP	5	1%
Allied Telesyn	4	1%
Dell	3	1%
3Com	2	1%
Enterasys	2	1%
Unknown	25	7%
Total	**372**	**100%**

Section 8. Further information

8.1 Resources

In an effort to seek out every known IXP in Europe, the following online resources were used:

- **Ep.net**
  Exchange Point repository on Exchanges in Europe
  http://www.ep.net/naps_eu2.html

- **The Peering Db**
  https://www.peeringdb.com/

- **Packet Clearing house (PCH)**
  Internet Exchange Directory
  http://www.pch.net/ixpdir/Main.pl

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 43 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 Radovcic is the Secretary General of Euro-IX. After deciding to hang up his paddle and leave the world of whitewater kayak instructing behind, he has since 2000 been closely involved in working with European Internet Exchange Points. He is in personal and regular contact with more than 70 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.

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