



La televisione del futuro - Le prospettive del mezzo televisivo nella transizione digitale

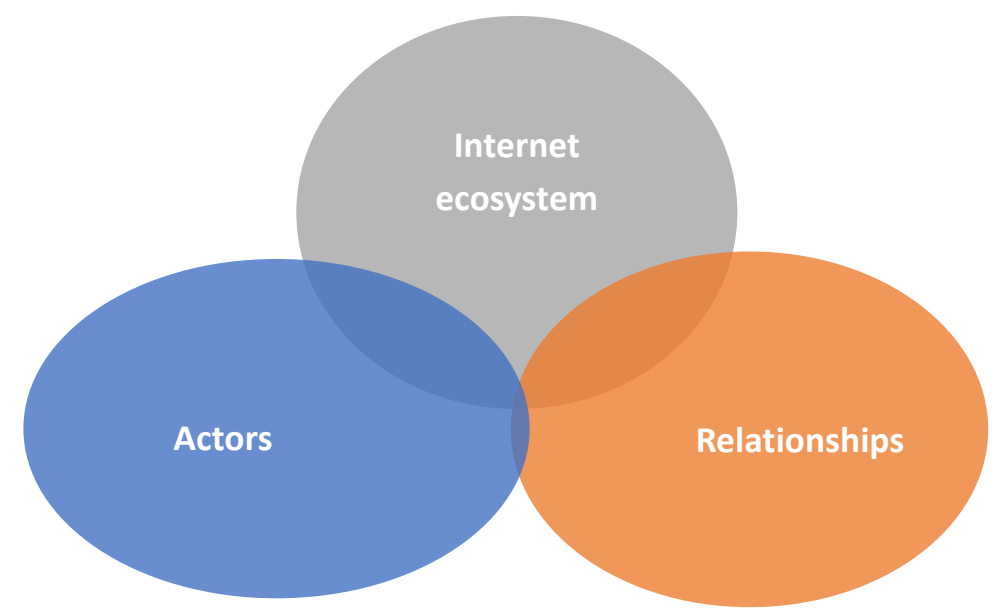
La rete Internet, l'impatto della TV in streaming,
Internet Exchange Point (IXP) e Content Delivery Network (CDN)

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Namex CTO
Ordine degli Ingegneri della Provincia di Roma

Roma, 4 Dicembre 2024

Internet

Come rete di reti, Internet dipende in modo cruciale da un'adeguata interconnessione tra i diversi partecipanti dell'ecosistema



PeeringDB Search here for a network, IX, or facility. Register or Login

Advanced Search

Amazon.com Diamond Sponsor

Organization	Amazon.com
Also Known As	Amazon Web Services
Long Name	
Company Website	http://www.amazon.com
ASN	16509
IRR as-set/route-set	AS-AMAZON
Route Server URL	
Looking Glass URL	
Network Type	Enterprise
IPv4 Prefixes	6000
IPv6 Prefixes	2000
Traffic Levels	Not Disclosed
Traffic Ratios	Balanced
Geographic Scope	Global
Protocols Supported	☒ Unicast IPv4 ☐ Multicast ☐ IPv6 servers
Last Updated	2021-10-20T12:54:19Z
Public Peering Info Updated	2021-12-02T20:57:44
Peering Facility Info Updated	2021-11-23T16:21:38
Contact Info Updated	2020-12-01T12:29:55Z
Notes	AWS Peering: https://peering.aws/ Peering requests:

PeeringDB Search here for a network, IX, or facility. Register or Login

Advanced Search

Cogent Communications, Inc.

Organization	Cogent Communications, Inc.
Also Known As	
Long Name	
Company Website	http://www.cogentco.com/
ASN	174
IRR as-set/route-set	
Route Server URL	
Looking Glass URL	http://www.cogentco.com/en/network/looking-glass
Network Type	NSP
IPv4 Prefixes	420000
IPv6 Prefixes	60000
Traffic Levels	100+Tbps
Traffic Ratios	Not Disclosed
Geographic Scope	Global
Protocols Supported	☒ Unicast IPv4 ☐ Multicast ☐ IPv6 ☐ Never via route servers
Last Updated	2021-10-12T23:13:27Z
Public Peering Info Updated	
Peering Facility Info Updated	2021-08-05T08:52:38
Contact Info Updated	2021-10-12T23:13:15
Notes	

Public Peering Exchange Points Filter

Exchange	ASN	Speed	RS Peer
1-Net East	Singapore		
1025Connect	United States of America		
123.NET - DC1 - 24700 Northwestern Blvd.	United States of America		
1500.Champa	United States of America		
151 Front Street West Toronto	Canada		
300 Bent	Toronto		
365 Data Centers Buffalo (BU1)	United States of America		
365 Data Centers Chicago (CH6)	United States of America		
365 Data Centers Detroit (DT1)	United States of America		
365 Data Centers Indianapolis (IN1)	United States of America		
365 Data Centers Nashville (NA1)	United States of America		
365 Data Centers New York (NY10)	United States of America		
365 Data Centers Philadelphia (PH2)	United States of America		

Private Peering Facilities Filter

Facility	Country
1-Net East	Singapore
1025Connect	United States of America
123.NET - DC1 - 24700 Northwestern Blvd.	United States of America
1500.Champa	United States of America
151 Front Street West Toronto	Canada
300 Bent	Toronto
365 Data Centers Buffalo (BU1)	United States of America
365 Data Centers Chicago (CH6)	United States of America
365 Data Centers Detroit (DT1)	United States of America
365 Data Centers Indianapolis (IN1)	United States of America
365 Data Centers Nashville (NA1)	United States of America
365 Data Centers New York (NY10)	United States of America
365 Data Centers Philadelphia (PH2)	United States of America

Peering Policy Information

Peering Policy	
General Policy	No
Multiple Locations	Not Required
Ratio Requirement	No
Contract Requirement	Not Required



Definizioni: Content Delivery Network e Internet eXchange Point

CDN (Content Delivery Network)

Una rete distribuita di server che collabora per consegnare contenuti web e multimediali agli utenti finali in modo rapido ed efficiente.

Funzioni principali:

- Ridurre la latenza migliorando il tempo di caricamento delle pagine.
- Distribuire i contenuti da server vicini geograficamente all'utente.
- Gestire picchi di traffico.

Esempi di utilizzo:

- Streaming video, download di software, e-commerce, gaming online.



Definizioni: Content Delivery Network e Internet eXchange Point

IXP (Internet Exchange Point)

Una infrastruttura fisica che consente a diversi provider di servizi Internet (ISP) e reti di scambiarsi traffico in modo diretto.

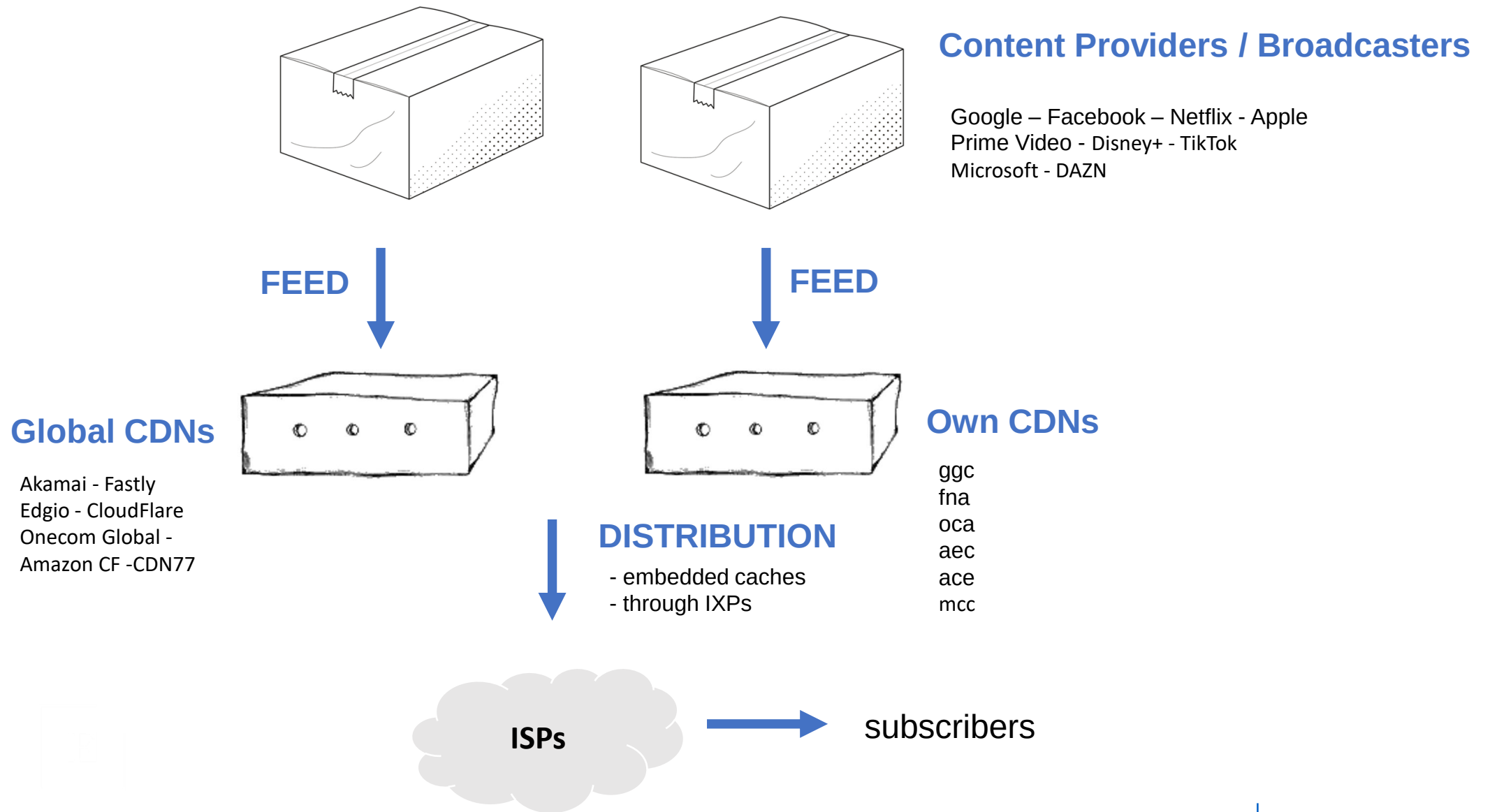
Funzioni principali:

- Migliorare l'efficienza del routing del traffico Internet.
- Ridurre i costi di transito grazie alla connessione diretta tra le reti.
- Ridurre la latenza migliorando la qualità del servizio.

Esempi:

- Namex (Roma), LINX (Londra), IX.br (Brasile).

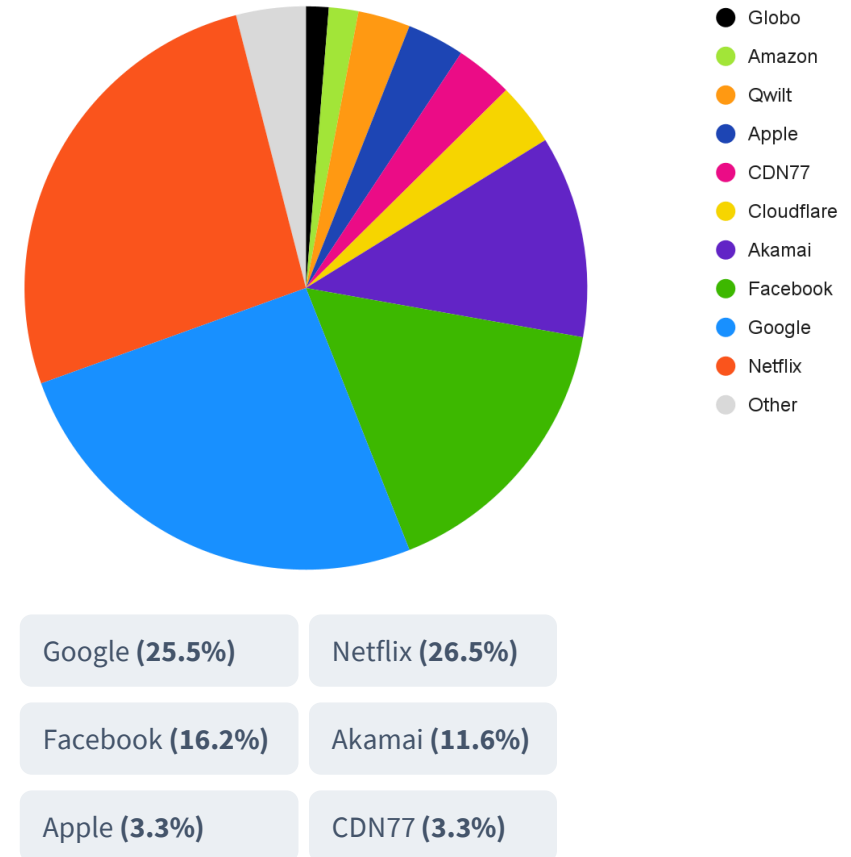
Distribuzione del contenuto



Distribuzione del contenuto

Gli hypergiants che installano server all'interno di altre reti migliorano le sfide fondamentali di Internet — capacità, latenza e congestione — e riducono la quantità di traffico che attraversa le interconnessioni di peering.

Oltre 3.500 ASN a livello globale hanno embedded servers

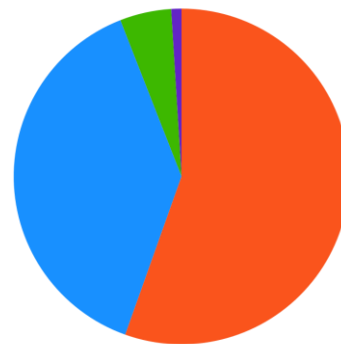


Distribuzione del contenuto



-  ~74% over the external network border
-  ~14% from embedded servers
-  ~7% embedded to embedded internally in the networks
-  ~5% Externally to embedded

Google



-  Outside to end-users (39%)
-  Embedded to end-users (56%)
-  Outside to embedded (5%)
-  Embedded to embedded (1%)

Facebook



-  Outside to end-users (43%)
-  Embedded to end-users (54%)
-  Outside to embedded (4%)
-  Embedded to embedded (0%)

Akamai

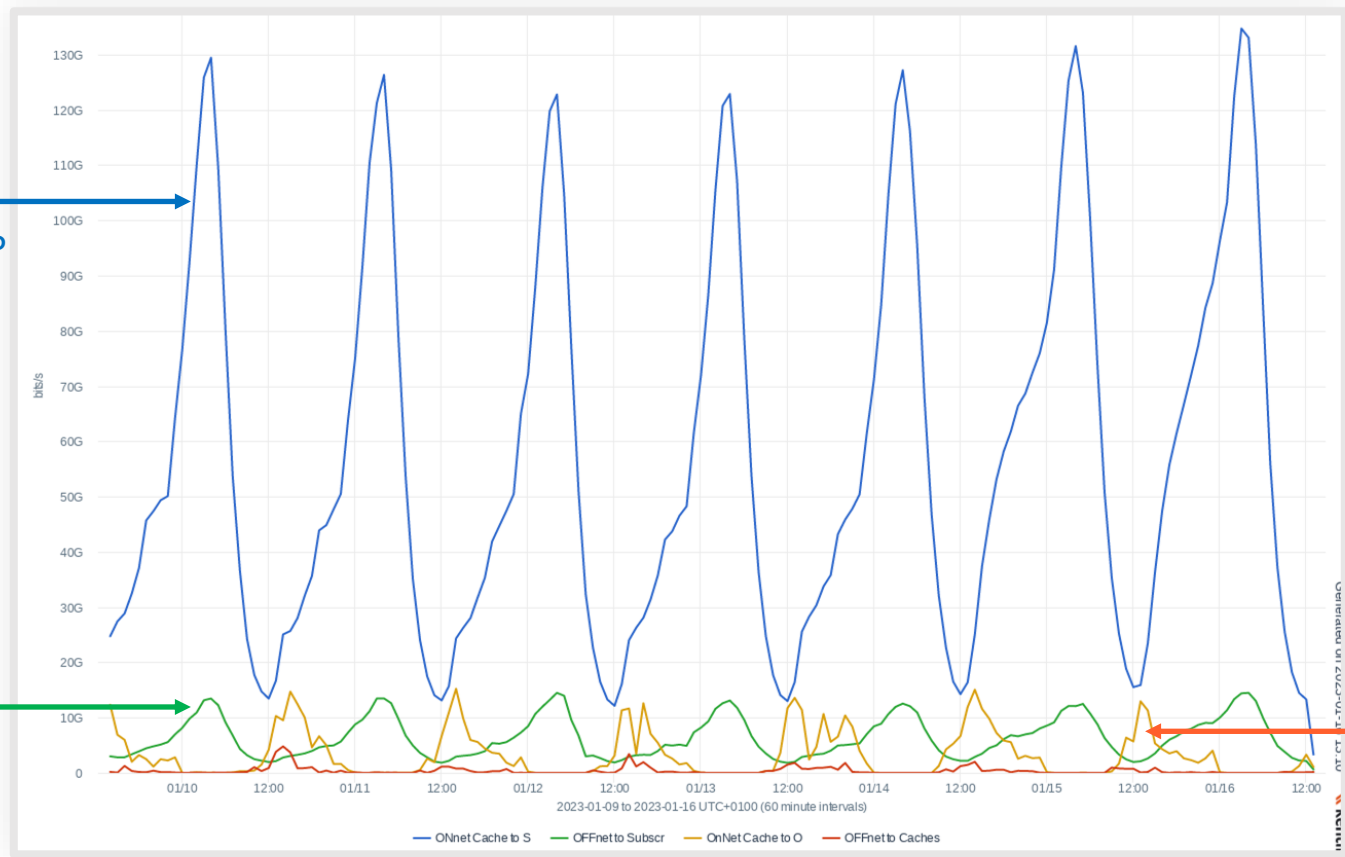


-  Outside to end-users (73%)
-  Embedded to end-users (18%)
-  Outside to embedded (9%)
-  Embedded to embedded (0%)

Distribuzione del contenuto

Blue line is the delivery inside the ISP

Green line is the delivery to the long tail (IXP)



Netflix

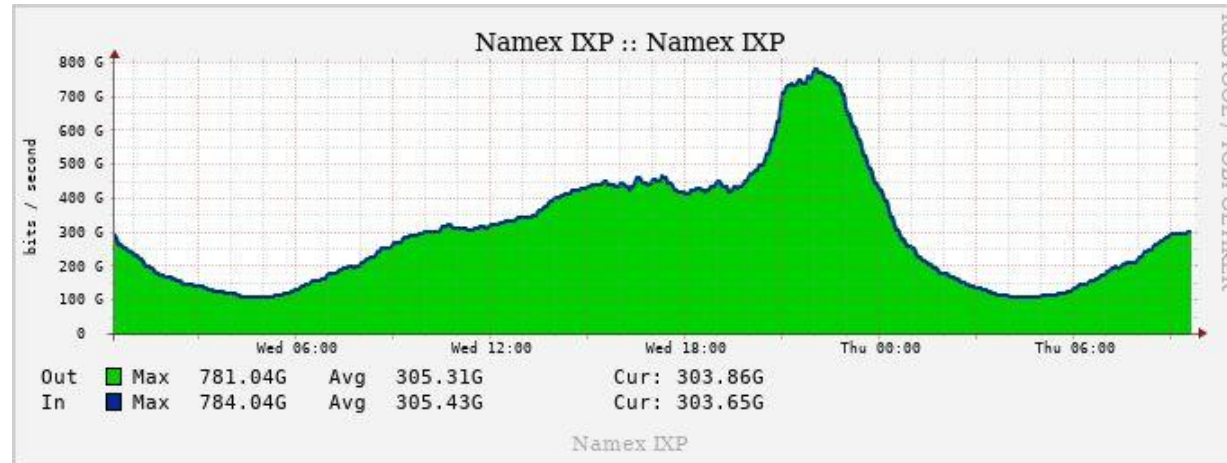


- Outside to end-users (22%)
- Embedded to end-users (72%)
- Outside to embedded (3%)
- Embedded to embedded (3%)

Red line is the filling caches traffic

Typical Netflix traffic profile in well dimensioned deployment

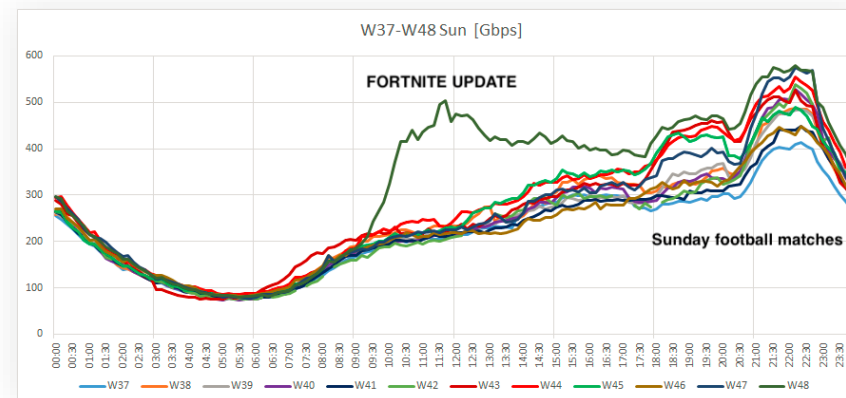
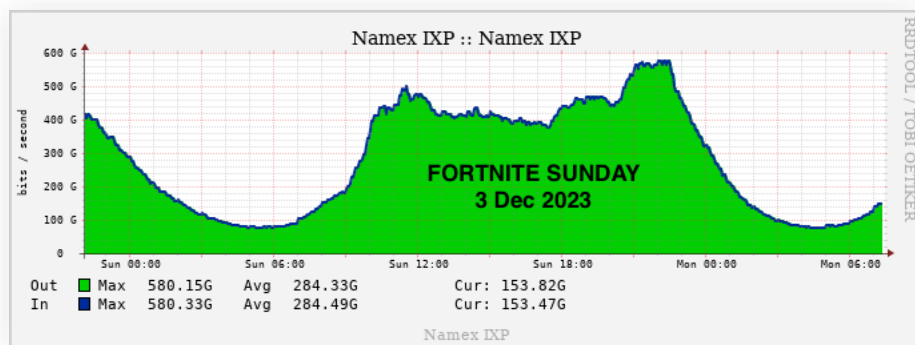
Distribuzione del contenuto



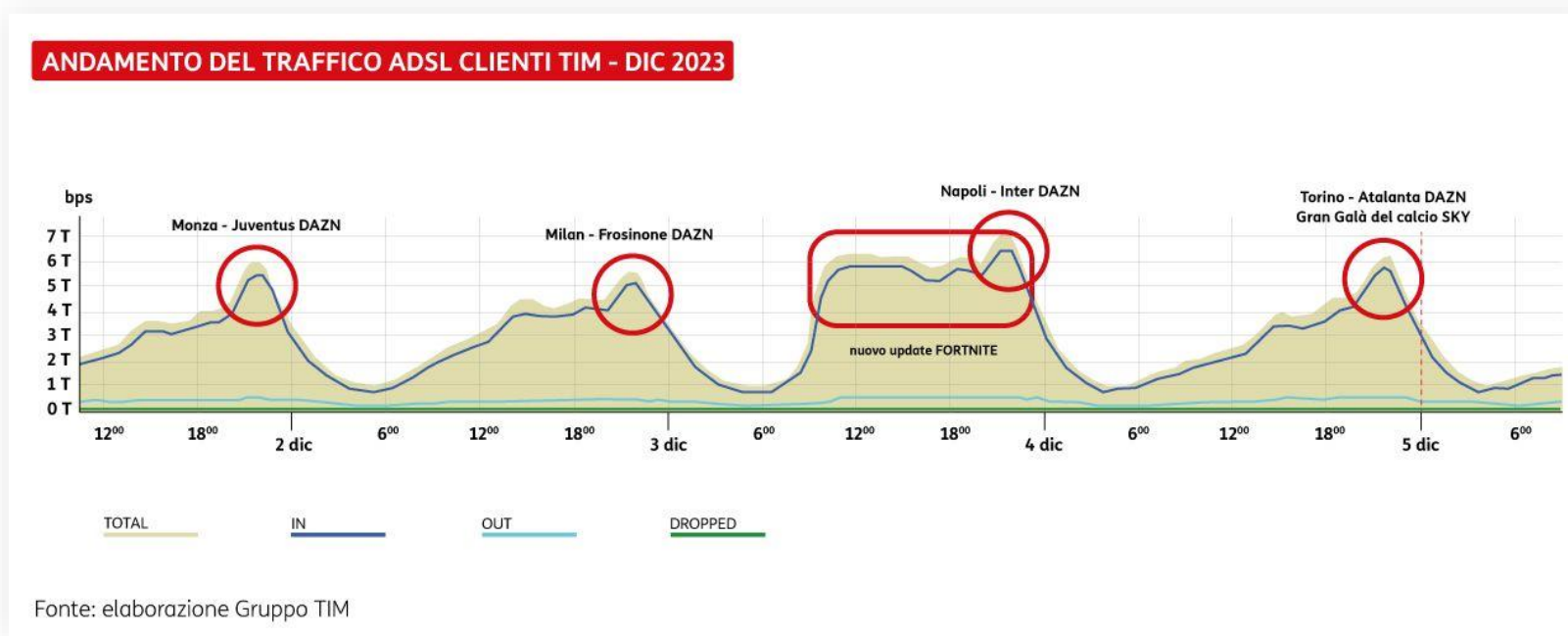
NOTE: The image above shows the typical Internet traffic graph of an IXP. The vertical axis represents the unit of measurement for data transmission speed (Gbps, Gigabits per second), while the horizontal axis shows the timeline (the last 24 hours). Data is collected at regular intervals, typically every 5 minutes. Along with this daily graph, the weekly, monthly, and yearly graphs are often displayed as well. When referring to traffic peaks, it means the highest value in a given time frame. In the image above, for example, the Internet traffic peak is 784.04 Gbps.

https://labs.ripe.net/author/flavio_luciani_1/the-internet-exchange-point-a-window-onto-a-changing-internet/

Distribuzione del contenuto

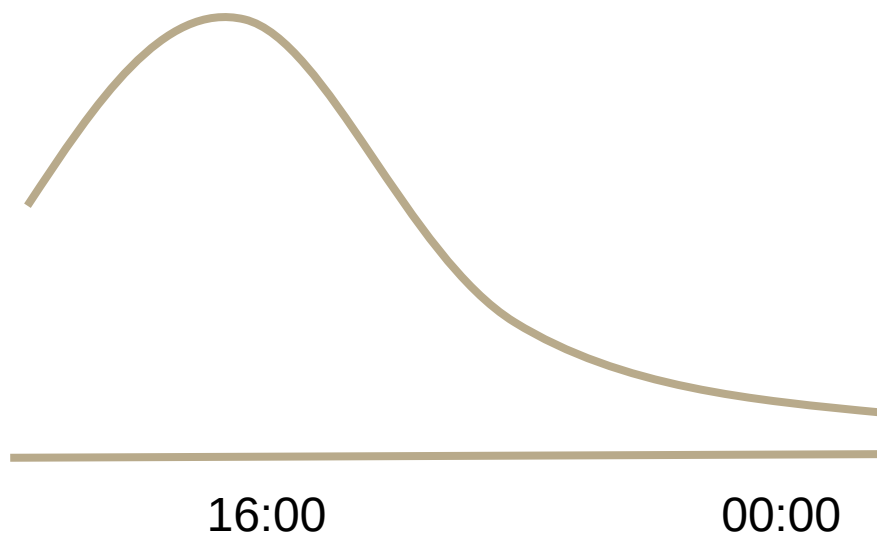


**DAZN edge
(Football) + Akamai
(Fortnite)**

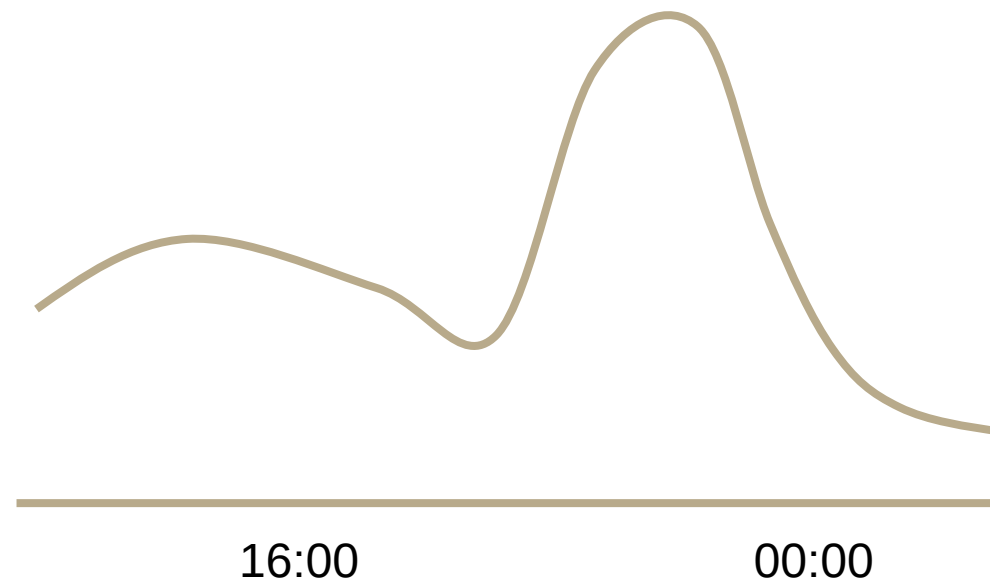




Distribuzione del contenuto



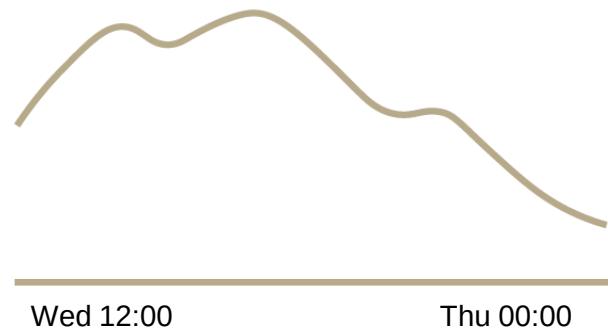
Until 2012



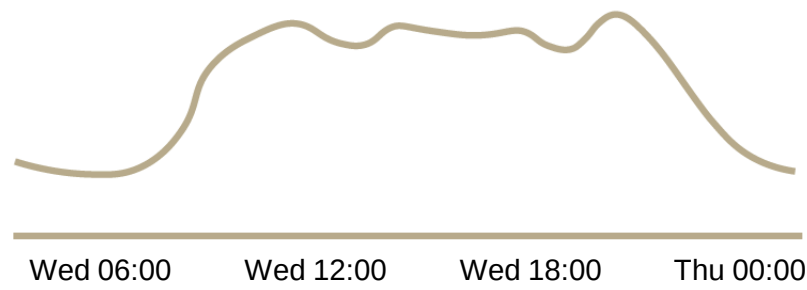
Then



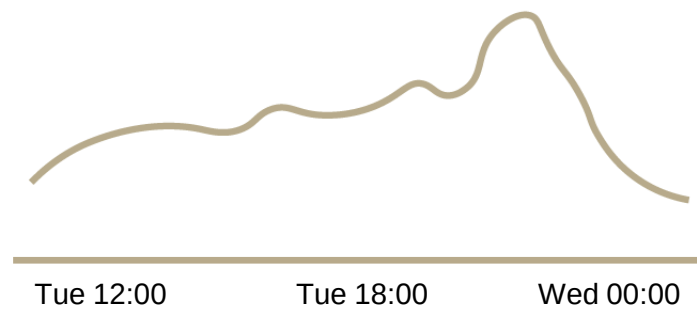
Distribuzione del contenuto



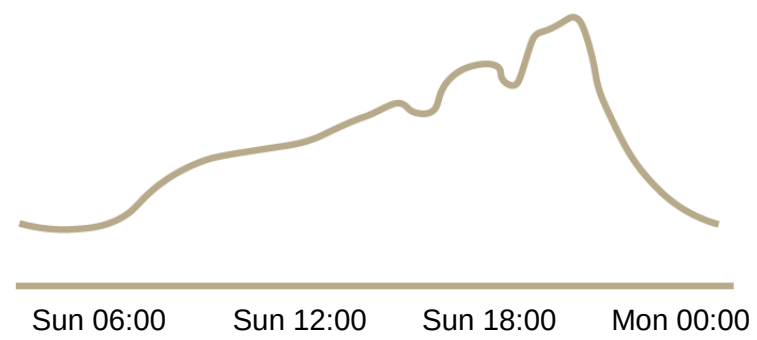
Prehistory
No series and movies on internet
(Until 2012)



Health Emergency #covid
(2020)



Entertainment services #ondemand
(2012 until today)

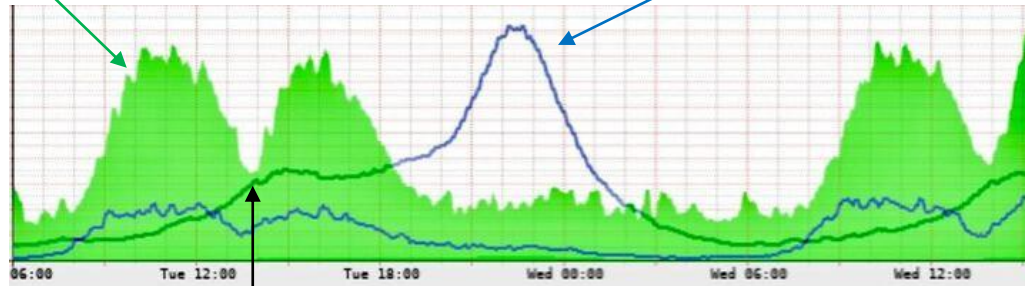


Entertainment services + live streaming
(2021)

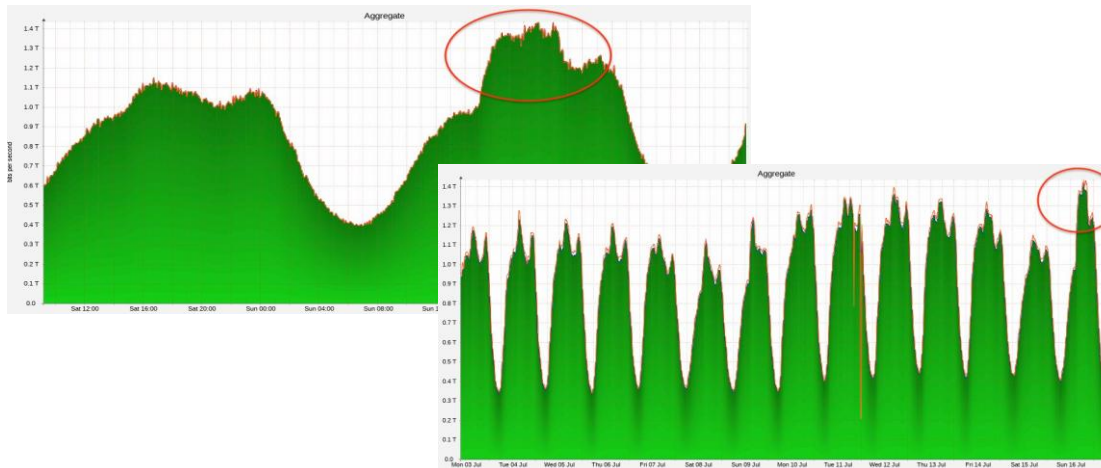
Distribuzione del contenuto

Green line is Microsoft

Blue line is Netflix

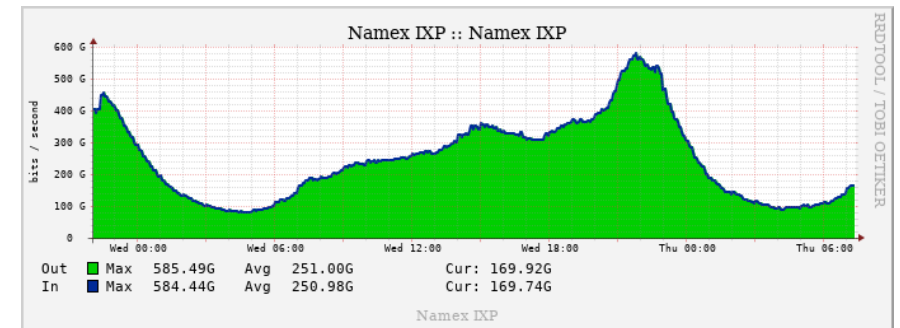
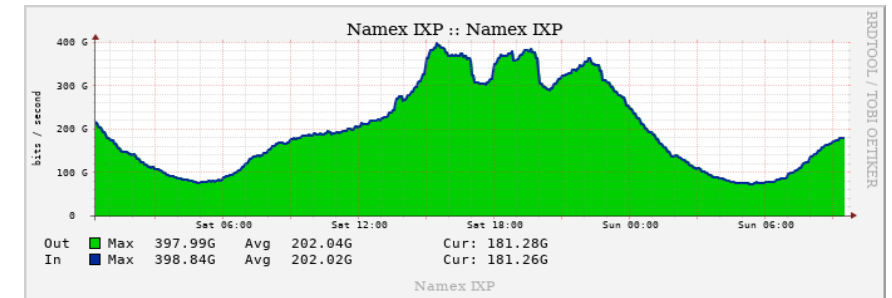


Lunch break

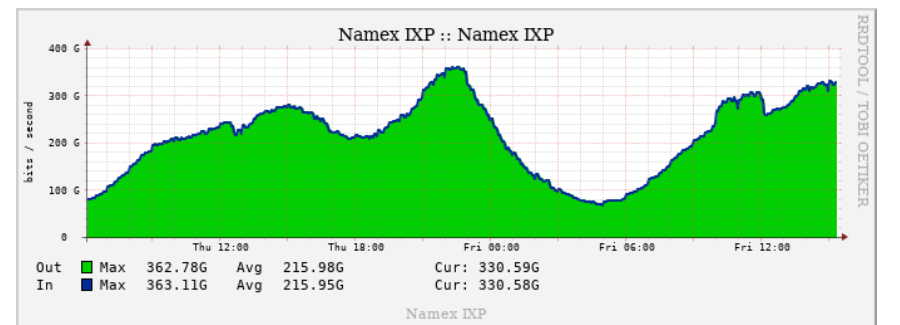


Wimbledon Final – Graph from Barcelona IXP

A Sunday with DAZN / Italian Serie A. Three matches

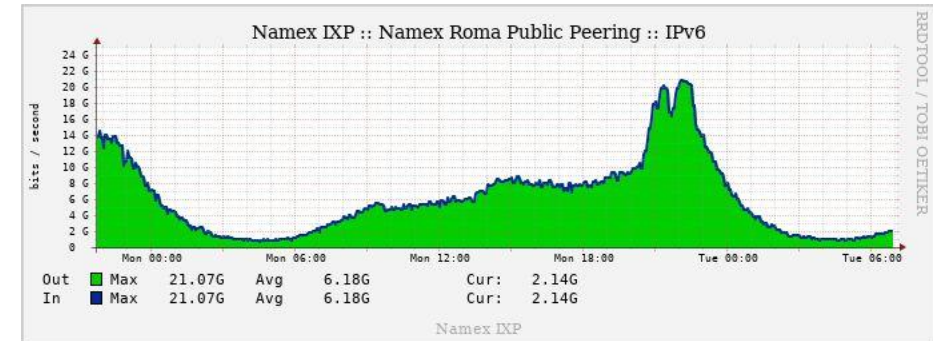
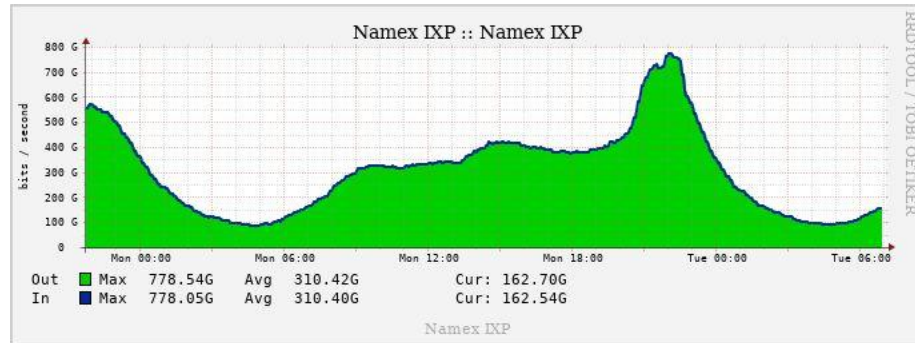


UEFA – Salisburgo – Inter (nov_2023)

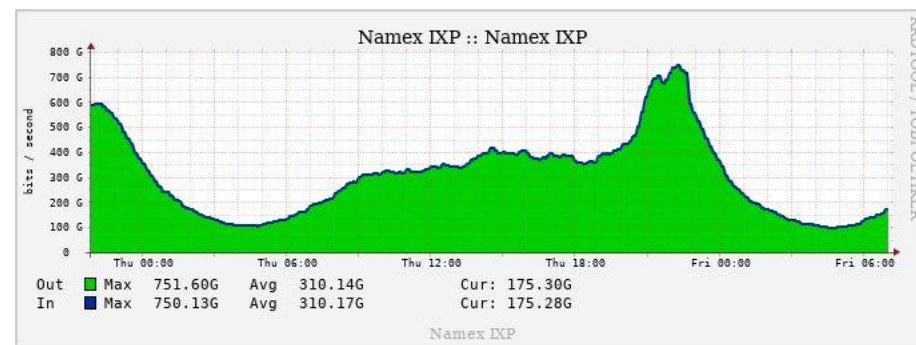


Italy – Serbia broadcasts by RAIPLAY (midday)

Distribuzione del contenuto

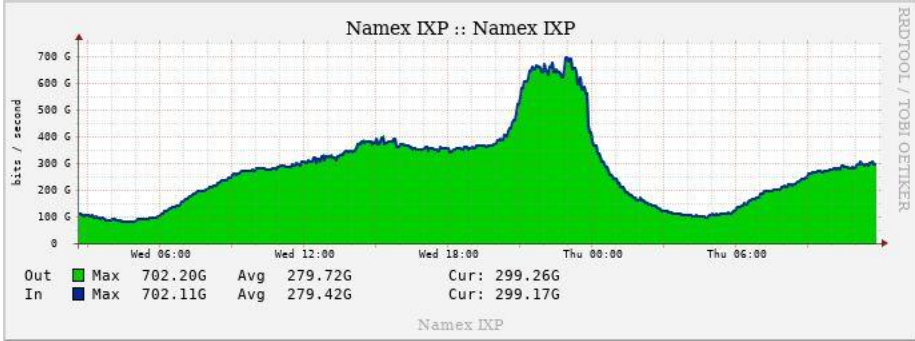


Nations League, Italy-Israel. Broadcast by [RaiPlay](#), RAI's digital platform. CDN: Mainstreaming

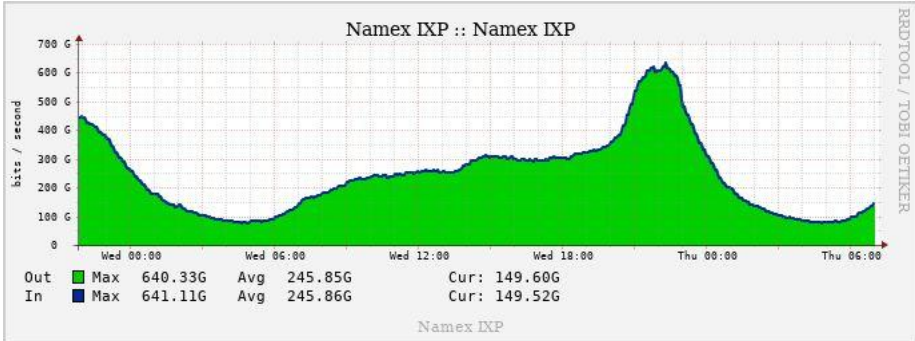


Italy - Belgium

Distribuzione del contenuto

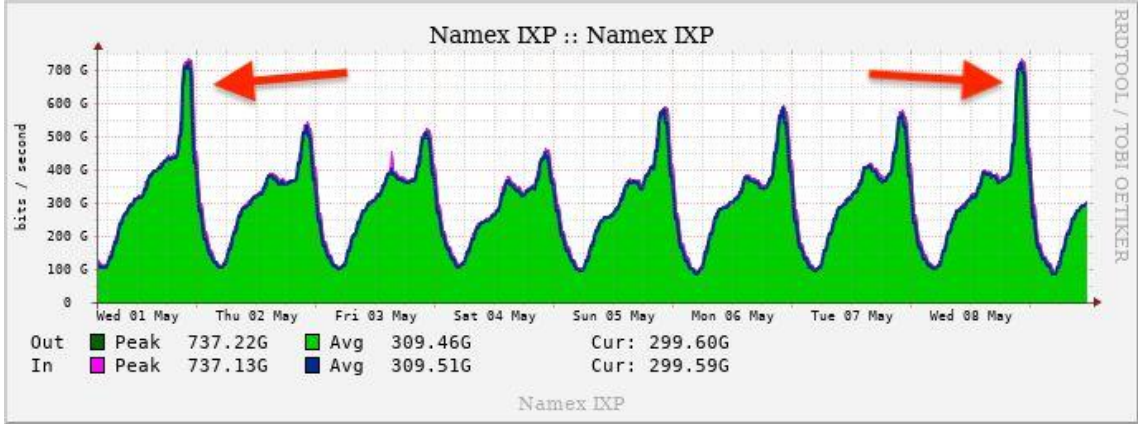


Man City VS Real Madrid (April 2024)

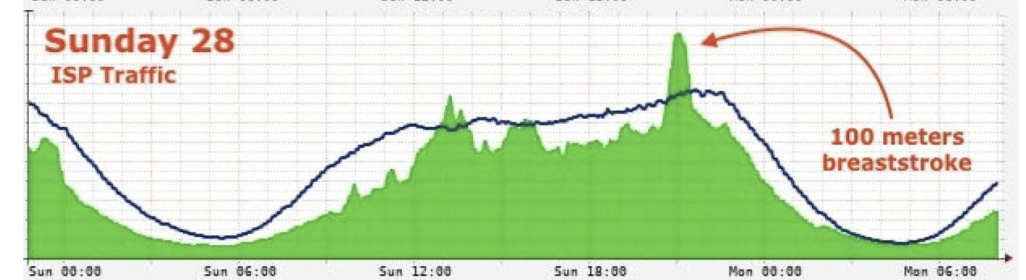
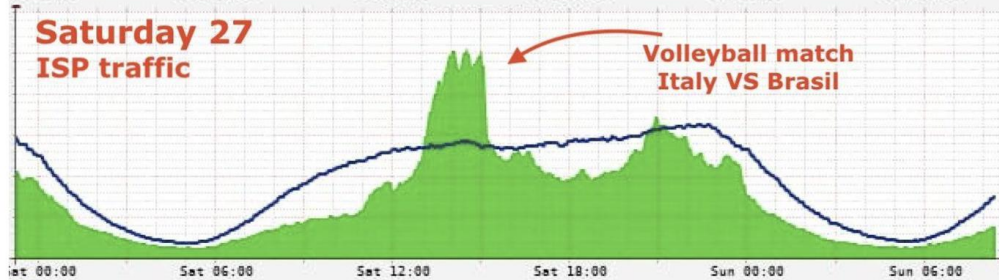
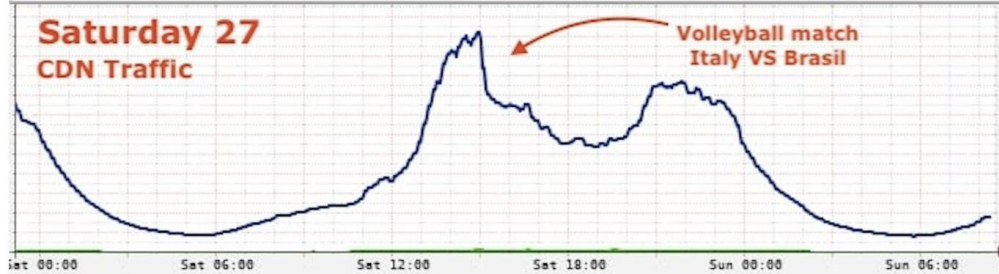
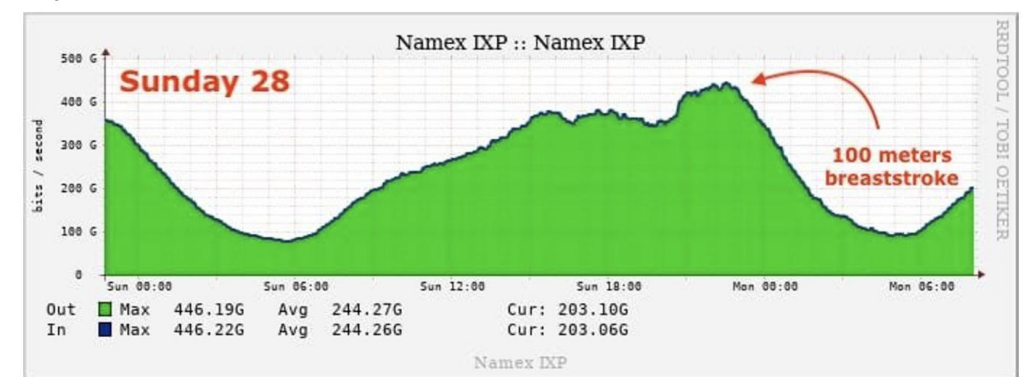
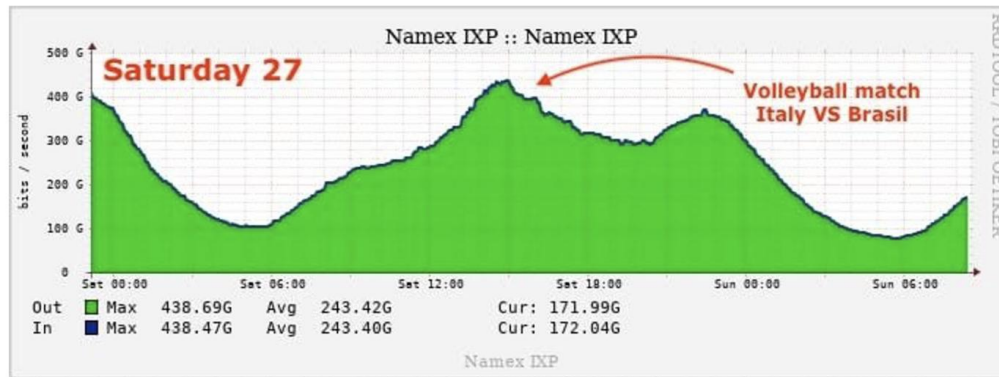


Barcellona VS Napoli (March 2024)

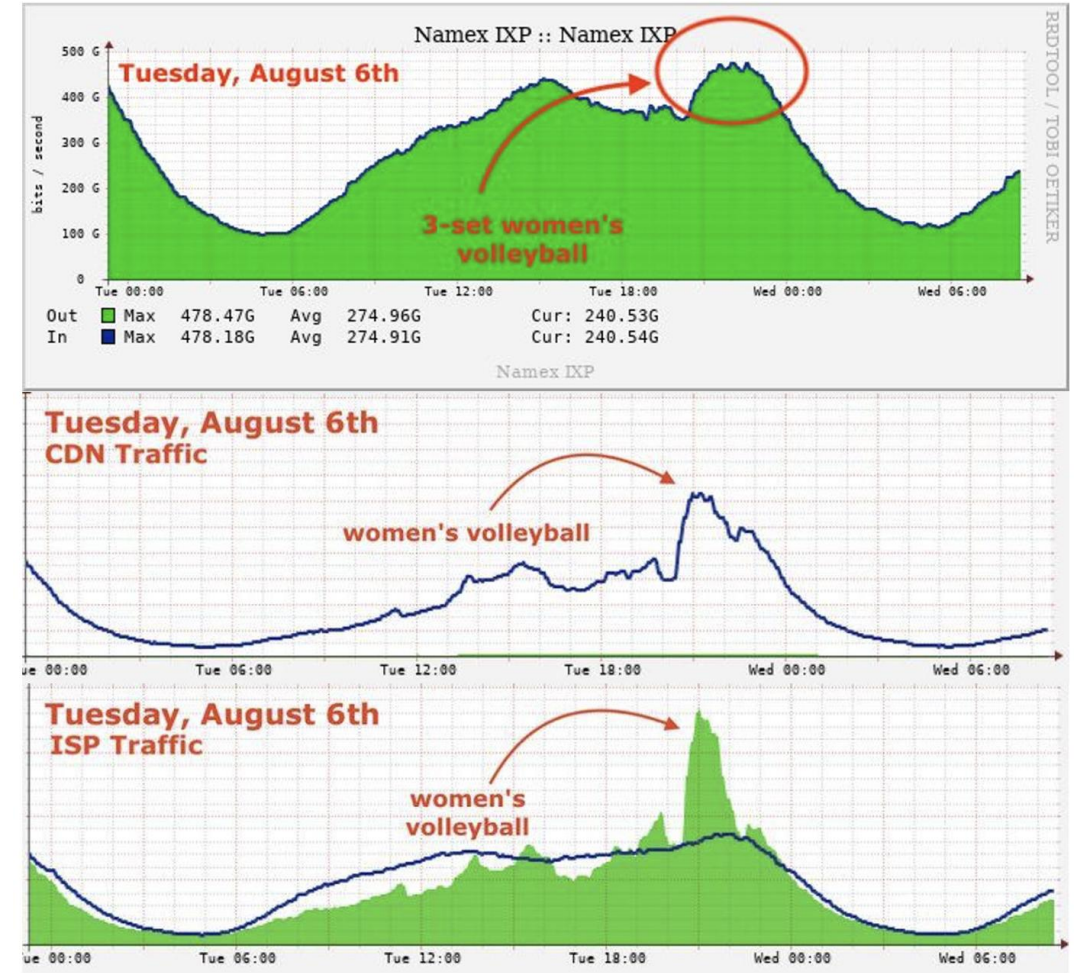
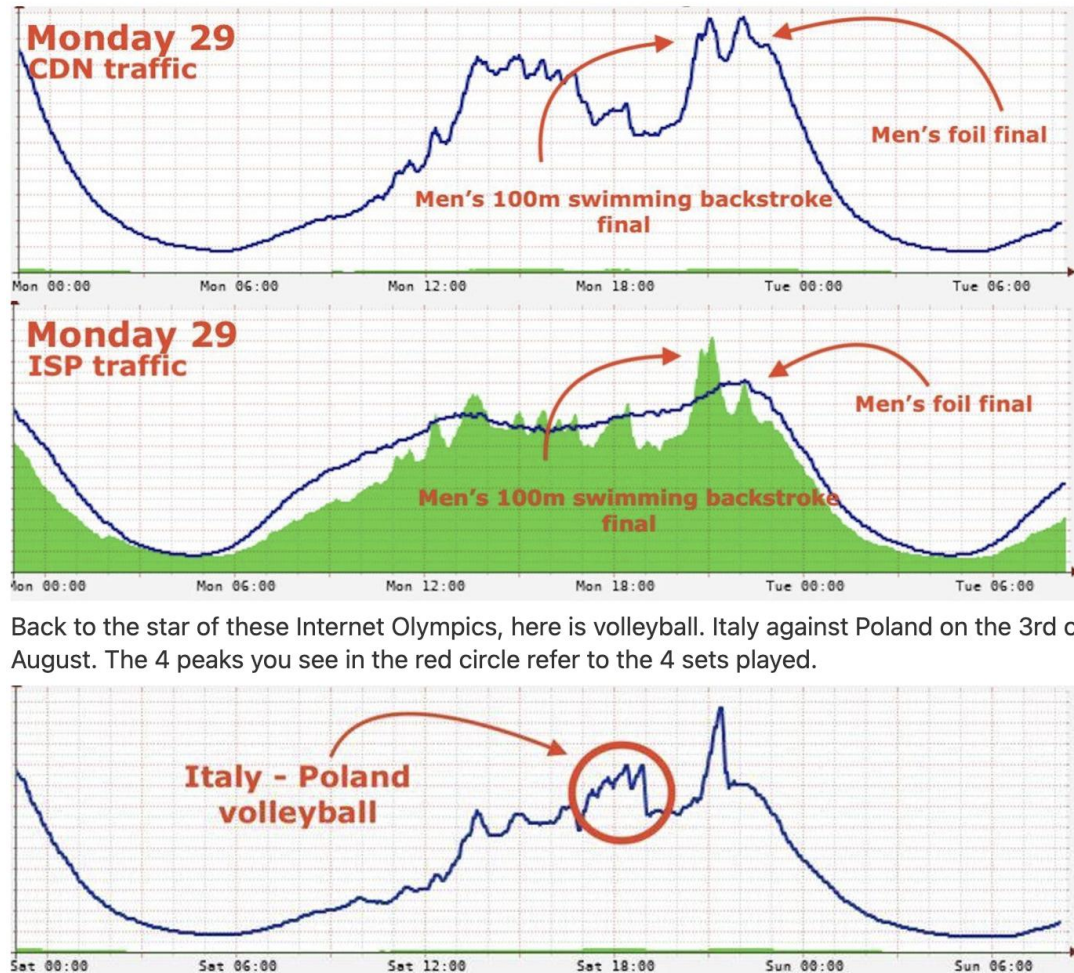
UEFA Champions League



Distribuzione del contenuto



Distribuzione del contenuto





GRAZIE PER L'ATTENZIONE

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