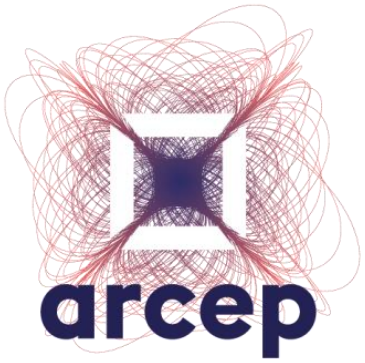


STATE OF INTERNET IN FRANCE:
Data Interconnection Market Evolution and Transition to IPv6

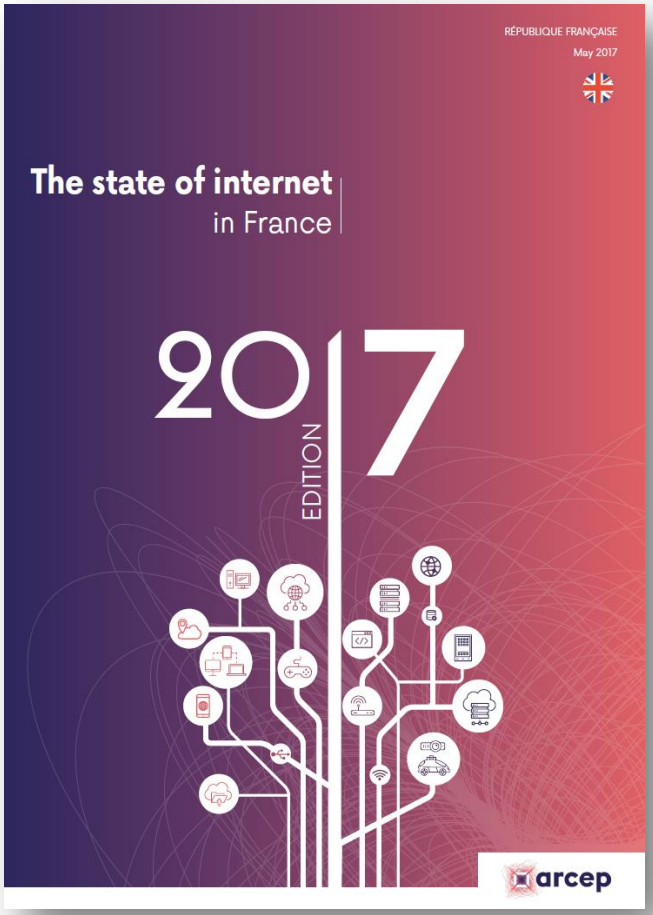
Samih Souissi – Open Internet Unit

RIPE 75
22-26 October 2017

Agenda

1. State of Internet in France Report Overview
2. Data interconnection market in France
   a. Why monitoring?
   b. Data gathering campaign
   c. Key findings
   d. Forward-looking considerations
3. Transition to IPv6
   a. Why encouraging the transition?
   b. Arcep work in IPv6 advocacy and transition acceleration
   c. Observations and learned lessons
   d. Perspectives

2017 - First Edition of the state of Internet in France



- Several issues adressed
  - Data Interconnection
  - Transition to IPv6
  - The quality of fixed internet access
  - Net Neutrality
  - Open platforms, with a focus on terminal
- Different external contributions

Inria INVENTEURS DU MONDE NUMÉRIQUE · BEREC · Commission européenne · La Quadrature du Net · Northeastern University · Internet Society · AFNUM Alliance Française des Industries du Numérique · afnic · CNNum Conseil National du Numérique · France IX Convergence hub · UFC Que Choisir · FFDN · Fédération Française des Télécoms · TECH'IN France

Monitoring the data interconnection market

A market that can generate tensions

- Occasional tensions, a required vigilance
  - tensions between actors who do not agree on the interconnection modalities
  - … vigilance on vertical integration or paid peering
  - … but discarding hard regulation / law

- Interconnection data gathering campaign
  - A thorough and up-to-date knowledge of the interconnection market
  - Allowing Arcep to
    - Consolidate its knowledge of the interconnection market in France
    - Understand its evolutions
  - Useful to:
    - Put Arcep in a position to react quickly
    - Encourage the actors to behave virtuously

Previous formal proceedings in France

Cogent / Orange
Free / Google
Arcep's decision

May 2011
Cogent complains vs Orange to the Competition Authority

October 2011
Arcep opinion to the Competition Authority

March 2012
Arcep decision n° 2012-0366 for interconnection data gathering

September 2012
Competition Authority accepts Orange's commitments

November 2012
Arcep investigation about Free's interconnection practices

July 2013
Arcep releases its conclusions about Free's practices

April 2014
Arcep updating decision n° 2014-0433-RDPI

Since 2012, data gathering and ongoing analysis

- Decision nº 2012-0366, updated by decision nº 2014-0433-RDPI
  - Scope & frequency
    - Group 1: Electronic communication providers in France → every 6 months
    - Group 2: Companies operating networks interconnected with group 1 → *ad hoc* basis

Sample response to the questionnaire on data conveyance and interconnection

. Date: 29 March 2012
. Respondent's name: My Company
. Contact information for the person in charge of responding to the questionnaire (main contact):

First name	First name
Last name	Last name
Title	Title
e-mail address	Email
Phone number	+33 1 00 00 00 00

. Individual agreements with other AS
- for each AS owned, please provide information on each point of interconnection/internet exchange point ("individual agreement") and on the cumulative value, with the 20 main partners and all partners after the 20 largest with AS marked "FR" or "EU" and sharing a total capacity of > 1 Gbit/s. Each point of interconnection/internet exchange point, and the cumulative value, must be given a separate row in the table.
- capacities entered into column H are bidirectional/duplex (i.e. the sum of incoming and outgoing traffic)
- you are free to choose the method used to calculate traffic streams entered in columns L and M, but ideally the 95th percentile for the period in question (please indicate the exact calculation method used at the end of the questionnaire; cf. supplementary questions)

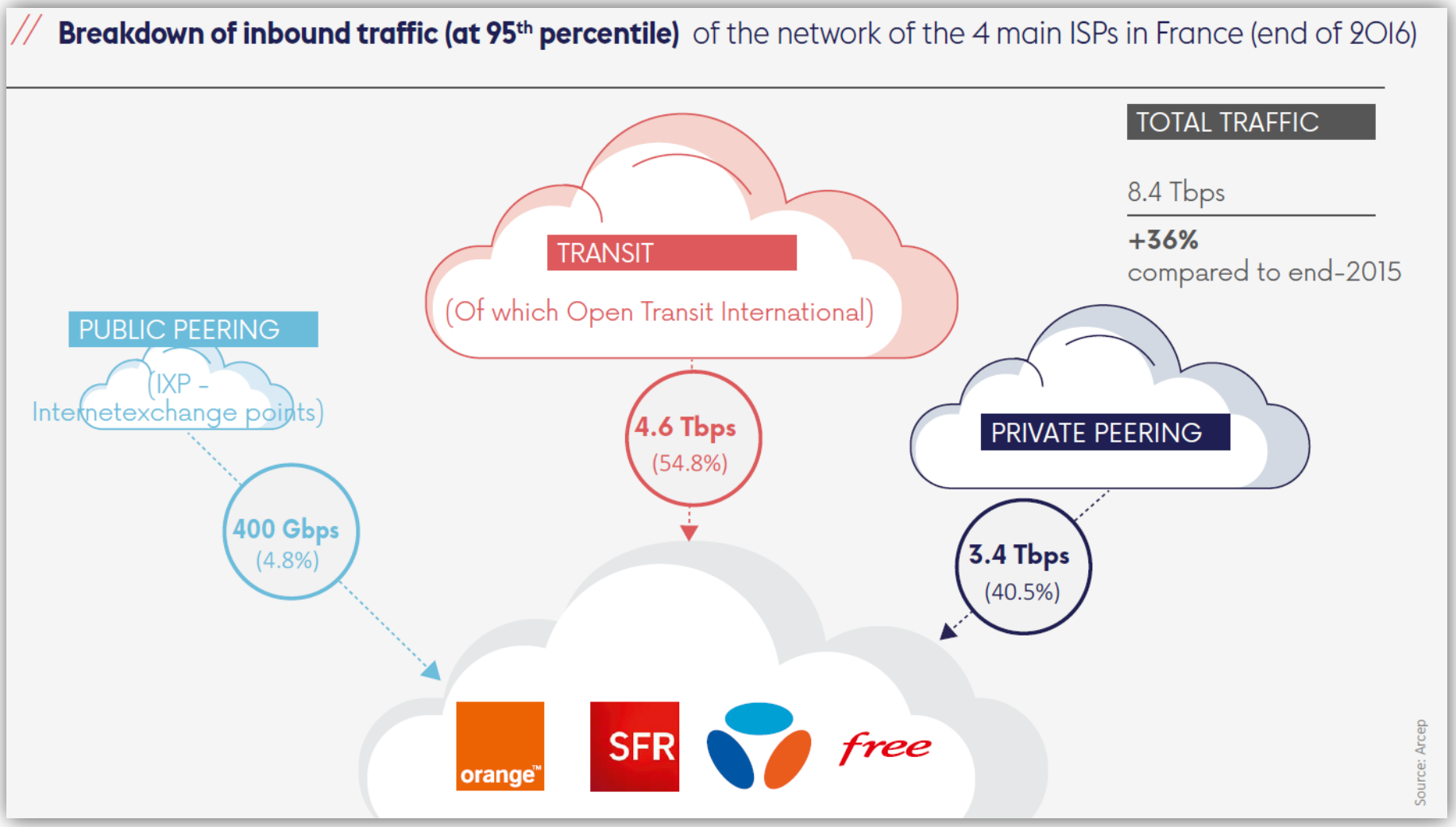
Identification No.	Name of AS #1/ASN	Name of AS #2/ASN	Start date	Partner's name & contact information	Type of relationship	Financial terms & conditions	Pricing scheme (and rates)	Capacity (Gbit/s)	Information on the PoI/IXP Traffic exchanged during the 6 months in question: Country	City	Name (or	Outgoing (Op. #1 to Op. #2)	Incoming (Op. #2 to Op. #1)	Remarks
1	AS 1 / 1231	AS 2 / 1232	01/02/2004	Company XXX Postal address [e-mail address]	1:n	Paid	Set-up fee: 100,000 Recurring: 100,000 a year	10	France	Paris	AS 2	5	8	
2	AS 1 / 1231	AS 3 / 1233	15/05/2001	Company XXX Postal address [e-mail address]	n:1	Paid	Set-up fee: €100,000 Recurring: €10,000 per Gbit/s	5	France	Paris	AS1	3	2	
3	AS 1 / 1231	AS 9 / 1250	15/05/2001	Company XXX Postal address [e-mail address]	n:1	Paid	Set-up fee: €100,000 Recurring: €10,000 per Gbit/s	3	France	Marseille	AS1	2	1,5	
4	AS 1 / 1231	AS 4 / 1234	01/07/2003	Company XXX Postal address [e-mail address]	1:1	Free	*N.A.*	5	France	Paris	FranceIX	2	2	
5	AS 1 / 1231	AS 5 / 1235	03/02/2005	Company XXX Postal address [e-mail address]	1:1	Paid on conditions	Recurring: €10,000 per Gbit/s beyond a ratio of 2:1	5	France	Paris	Equinix	2	1,5	
6	AS 1 / 1231	AS 1 / 771	01/01/2000	My Company Postal address	1:E	Free	*N.A.*	20	France	Paris	AS1	2	12	
7	AS 1 / 771	AS 1 / 1231	01/01/2000	My Company Postal address	E:1	Free	*N.A.*	20	France	Paris	AS1	12	2	
8	AS 1 / 771	AS 6 / 1236	01/01/2002	Company XXX Postal address [e-mail address]	1:1	Paid on conditions	Recurring: €10,000 per Gbit/s beyond a ratio of 2:1	20	France	Paris	AS1	8	9	
9	AS 1 / 771	AS 7 / 1237	04/07/2010	Company XXX Postal address [e-mail address]	1:n	Paid	Set-up fee: €100,000 Recurring: €250,000 a year	50	USA	New York	AS 7	10	25	
10	AS 1 / 771	AS 8 / 1238						70				10	42	
10.1			01/05/2001		1:E	Paid	Set-up fee: 100,000 Recurring: 300,000 a year	50	USA	New York	AS 8	5	22	
10.2			01/05/2001		1:E	Paid	Set-up fee: €100,000 Recurring: €300,000 a year	20	The Netherlands	Amsterdam	AS 8	5	20	
TOTAL								208				56	105	
of which E:1								*20*				*12*	*2*	
of which n:1								*8*				*5*	*2,5*	
of which 1:1								*30*				*12*	*12,5*	
of which 1:n								*60*				*15*	*33*	
of which 1:E								*90*				*12*	*54*	

. Agreements at an IXP

Identification No.	Name of AS #1/ASN	Name of IX	Start date	IX contact information	Type of relationship	Financial terms & conditions	Pricing scheme (and rates)	Capacity (Gbit/s)	Information on the internet exchange Traffic exchanged during the *6 months in question*: Country	City	Name (or	Outgoing (Op. #1 to Op. #2)	Incoming (Op. #2 to Op. #1)	Remarks
11	AS 1 / 1231	Equinix	03/02/2005	Postal address [e-mail address]	1:1	Free	*N.A.*	5	France	Paris	Equinix	2,2	2,3	
12	AS 1 / 1231	FranceIX	01/07/2003	Postal address [e-mail address]	1:1	Paid on conditions	Recurring: €10,000 per Gbit/s beyond a ratio of 2:1	5	France	Paris	FranceIX	2	1,5	
TOTAL								10				4,2	3,8	

.Calculation method used. If 95th percentile, please specify: frequency of sampling (e.g. every 15 minutes) and reference period (e.g. per month, 95th percentile for the month)
Quarterly average of 95th percentile of daily traffic (95th percentile calculated over the course of a day, traffic measured every 10 minutes).

1. Data gathering campaign (2012-2016)



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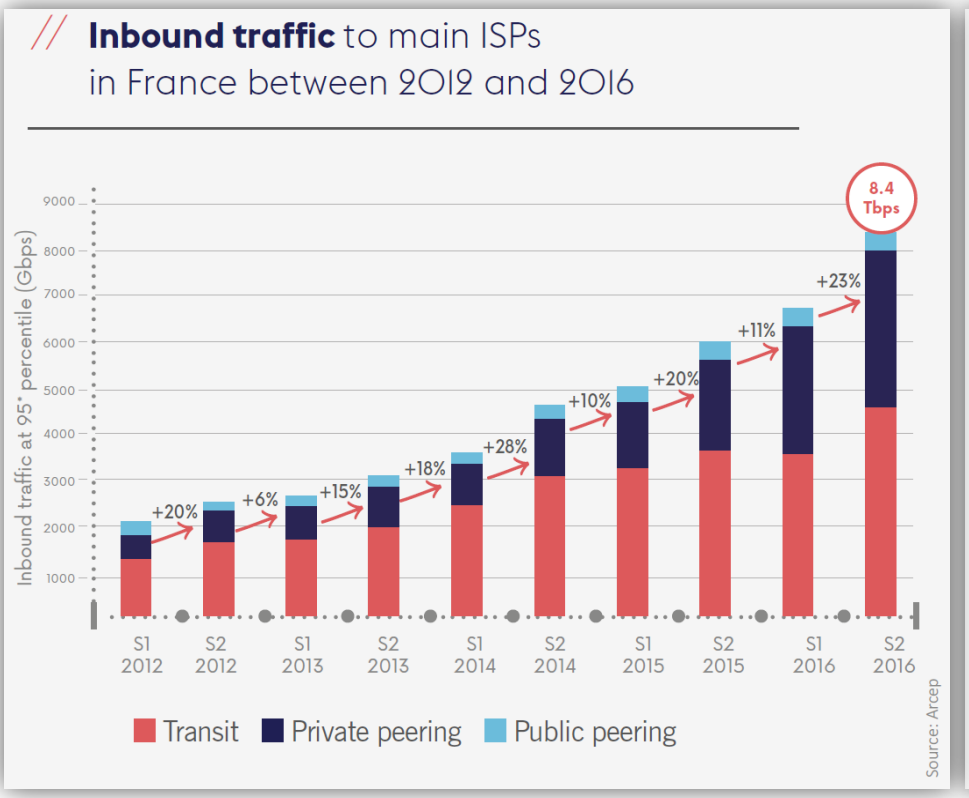

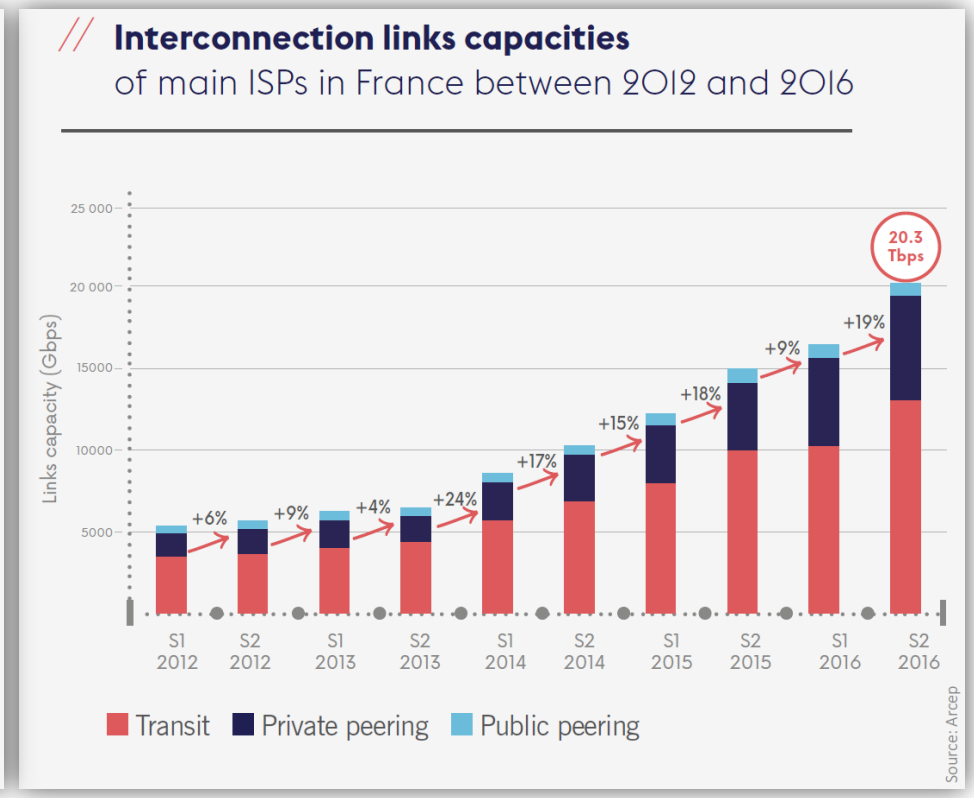

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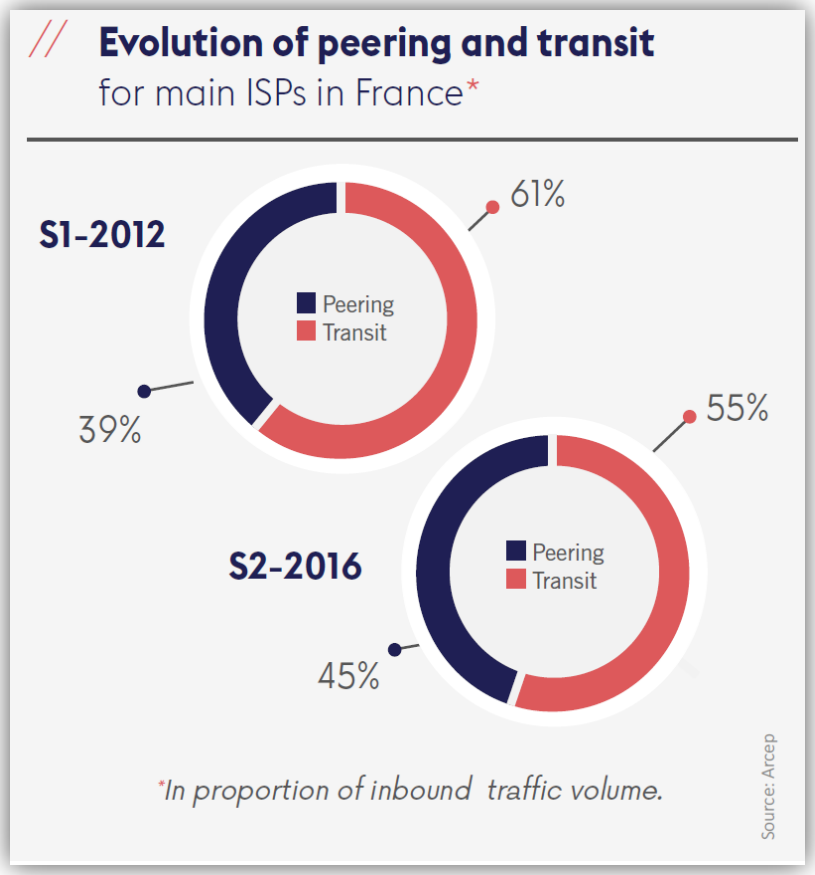
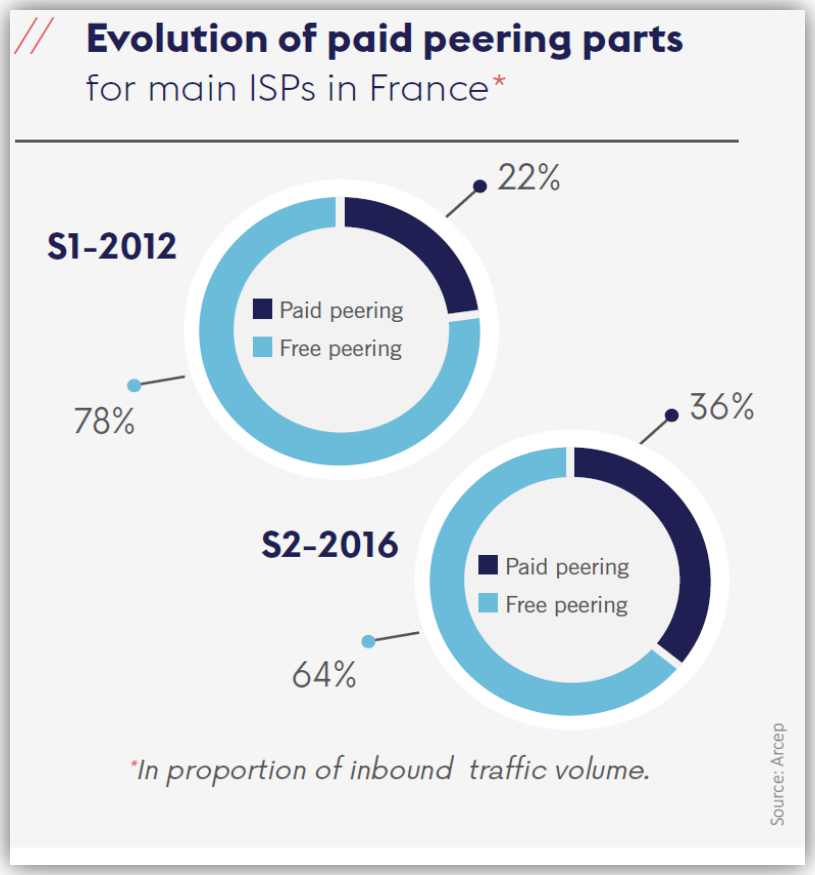
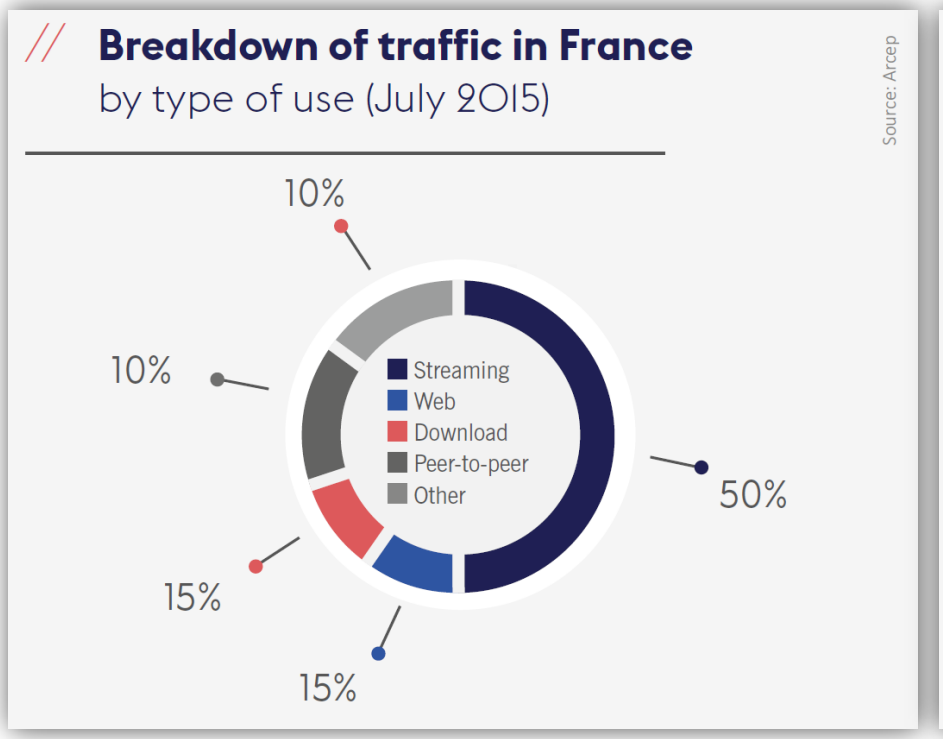


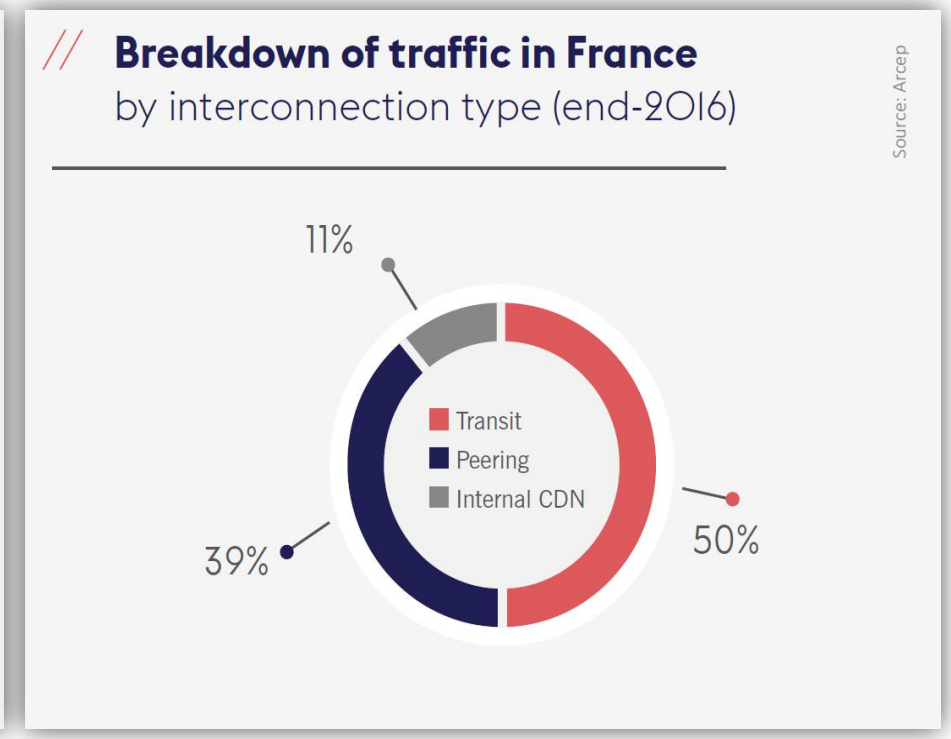


1. Data gathering campaign (2012-2016)

- Transit and Peering Costs
  - Transit
    - Steady decrease since 2012: between **€0.10** plus VAT and several euros plus VAT
    - Transit market size in France : **4 million euros per year**
  - Paid peering
    - between around **€0.25** plus VAT to several euros plus VAT
- Smaller ISPs in France
  - Belong to the Tier 3 operators' class
  - Have multiple transit providers
  - Interconnected with the main IXPs in France
  - Higher transit prices

2. Questionnaire on new market trends





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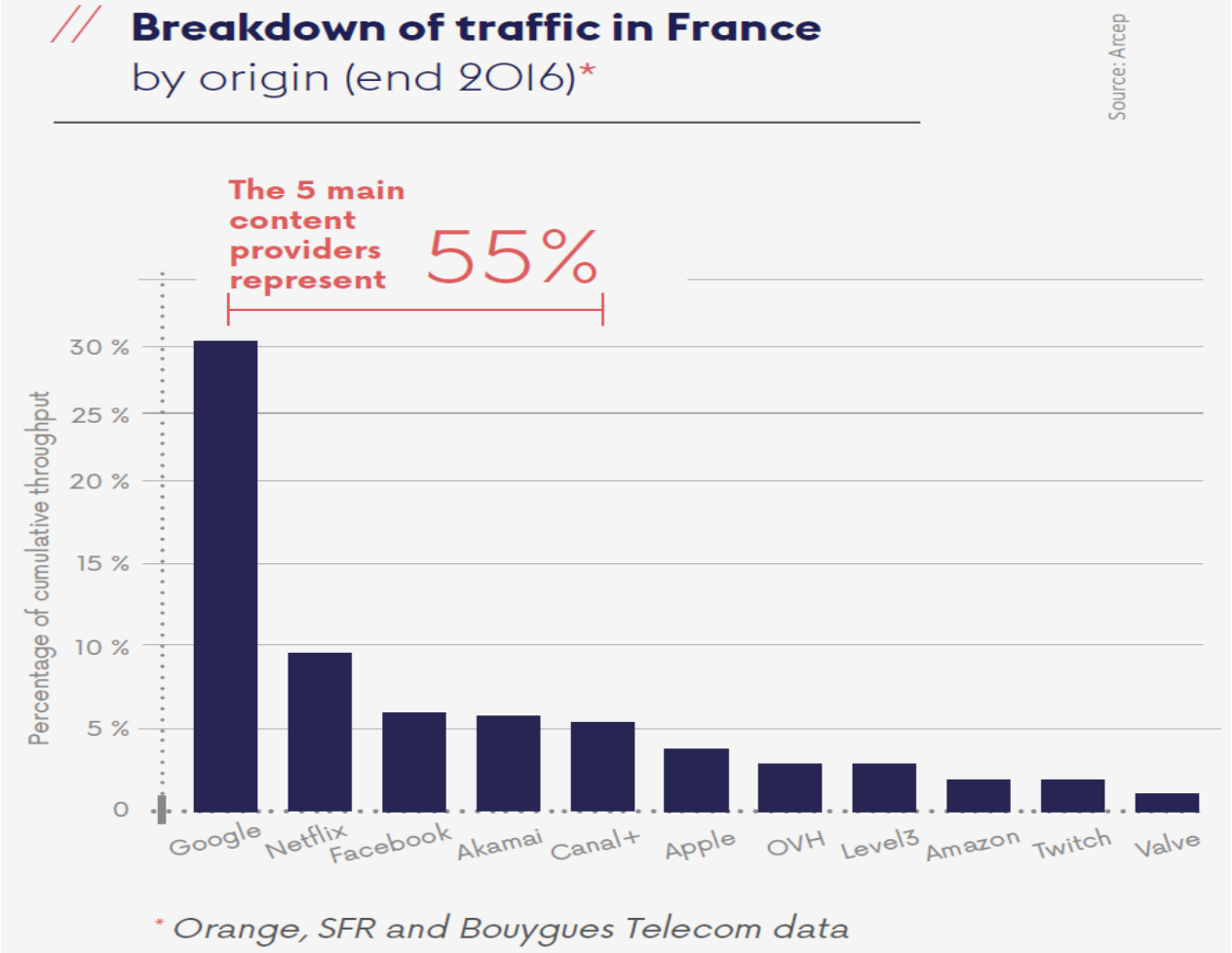


"Supervising without interfering"

- Keep on monitoring interconnection in France
  - … in order to be able to react swiftly in case of necessity.
- Investigate new market developments, on an *ad hoc* basis
  - e.g. internal CDN, local interconnection (Marseille, …), transition to IPv6, etc.
- Upgrade information gathering process
  - Take into consideration the increase in traffic from **internal CDN**
  - Incorporate the addressing concept **IPv4 or IPv6**

Encouraging the transition to IPv6

IPv4 adresses shortage and its consequences

- IPv4 addresses shortage
  - Gradual exhaustion of available addresses.
- Unavoidable transition
  - Too much transition delay would result in:
    - Explosion in costs
    - Dysfunctioning in certain service categories
    - Etc.
- IPv6: unlimited adressing and new functionalities
  - Ability to assign to each terminal or network node an individual IP address

    ➔accessible directly from any point of the Internet.
  - Simplification of certain network layer functions
  - Natively guaranteeing better security of exchanges.

Report to the government on the state of IPv6 deployment in France

Transition to IPv6 observatory creation

Available on Arcep website

OBSERVATOIRE DE LA TRANSITION VERS IPv6 EN FRANCE

31 MARS 2017

Evolution du taux d'utilisation d'IPv6 en France, tel qu'observé par Google

Source : Cisco - 6Lab

Etat de la transition IPv6 en France à différents maillons de la chaîne technique

Maillon	Source	Taux d'IPv6
Equipementiers	Questionnaire Arcep (2016)	100%
Fournisseurs d'accès internet (fixe)	Google (2017)	15%
Fournisseurs d'accès internet (mobile)	Arcep (2016)	0%
Fournisseurs de contenus	Cisco (2017)	50%
Infrastructure DNS	Observatoire de la résilience de l'Internet français (2015)	60%
Intermédiaires techniques	Cisco (2017)	70%

Etat de la transition IPv6 dans le monde au 31/03/2017
(Taux d'utilisation)

Source : Cisco - 6Lab

Sélectionnez l'indicateur à visualiser sur la carte Utilisation d'IPv6

***Utilisation d'IPv6** : Taux d'utilisation d'IPv6, tel qu'observé par Google.*

***Contenus IPv6** : Taux de sites web accessibles en IPv6 parmis les sites web les plus visités dans chaque pays.*

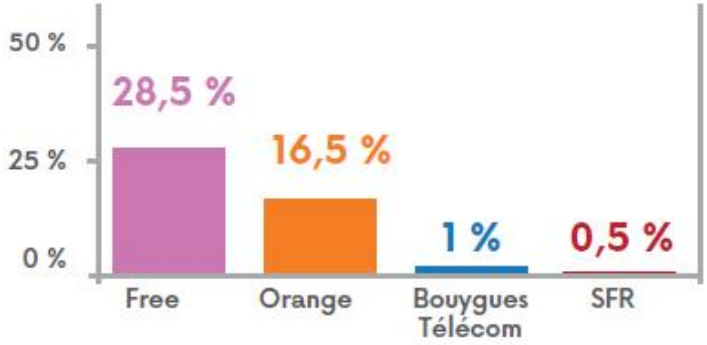
***Intermédiaires IPv6** : Taux d'intermédiaires techniques (par ex. transitaires) empruntés utilisant IPv6, pour chaque pays.*

Pays **France**

Utilisation d'IPv6 : **14,60 %**

Taux d'utilisation d'IPv6 sur les principaux réseaux fixes en France au 31/03/2017

Source : World IPv6 Launch données recueillies par l'Arcep



En France, Free a été le premier opérateur fixe majeur à proposer une connectivité IPv6 à ses clients. Ce déploiement remonte à 2007.

Orange a été le second opérateur à faire bénéficier ses clients fixes d'IPv6, début 2016. La grande majorité de ses clients FttH et VDSL est désormais dotée d'une connectivité IPv6 par défaut.

Observatory last update findings

- Increase in IPv6 use rate in France between December 2016 and March 2017.
  - Mainly due to the migration initiatives undertaken by Free in 2007 and by Orange in 2016, both for their fixed subscribers only.

- CAPs in the transition to IPv6.
  - Responsibility in the global transition process to IPv6.
  - 50% (weighted average) in terms of IPv6 deployment.
  - Many medium-sized or small CAPs have not yet migrated to IPv6.

- In order to benefit from this protocol, all stakeholders must jointly migrate.

Enhancing the observatory and fostering advocacy events

- Enhancing the transition to IPv6 observatory (action 4)
  - Second Half 2017
  - Include data and information directly collected from ISPs in France
    - E.g. IPv6 transition programme

- Contributing to the creation of advocacy events (action 3)
  - Foster reflections on IPv6 advocacy events
    - Better sharing of information and best practices

Thank you for your attention

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