Master Informatique 'NETWORKS'

Content

Les nouveaux Business Models

Quel(s) réseau(x) pour transporter quel(s) contenu(s)

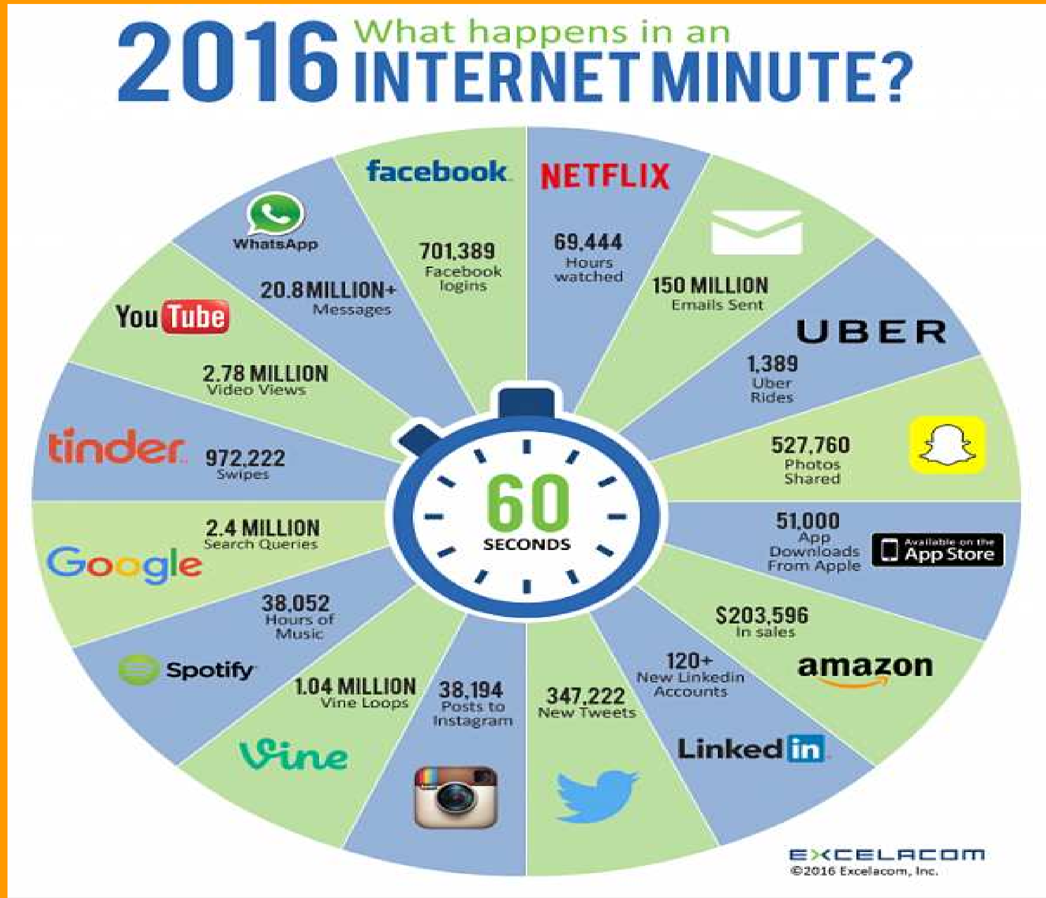
1 - Overview on Information Technology and Telecommunication domains

Trends

Market

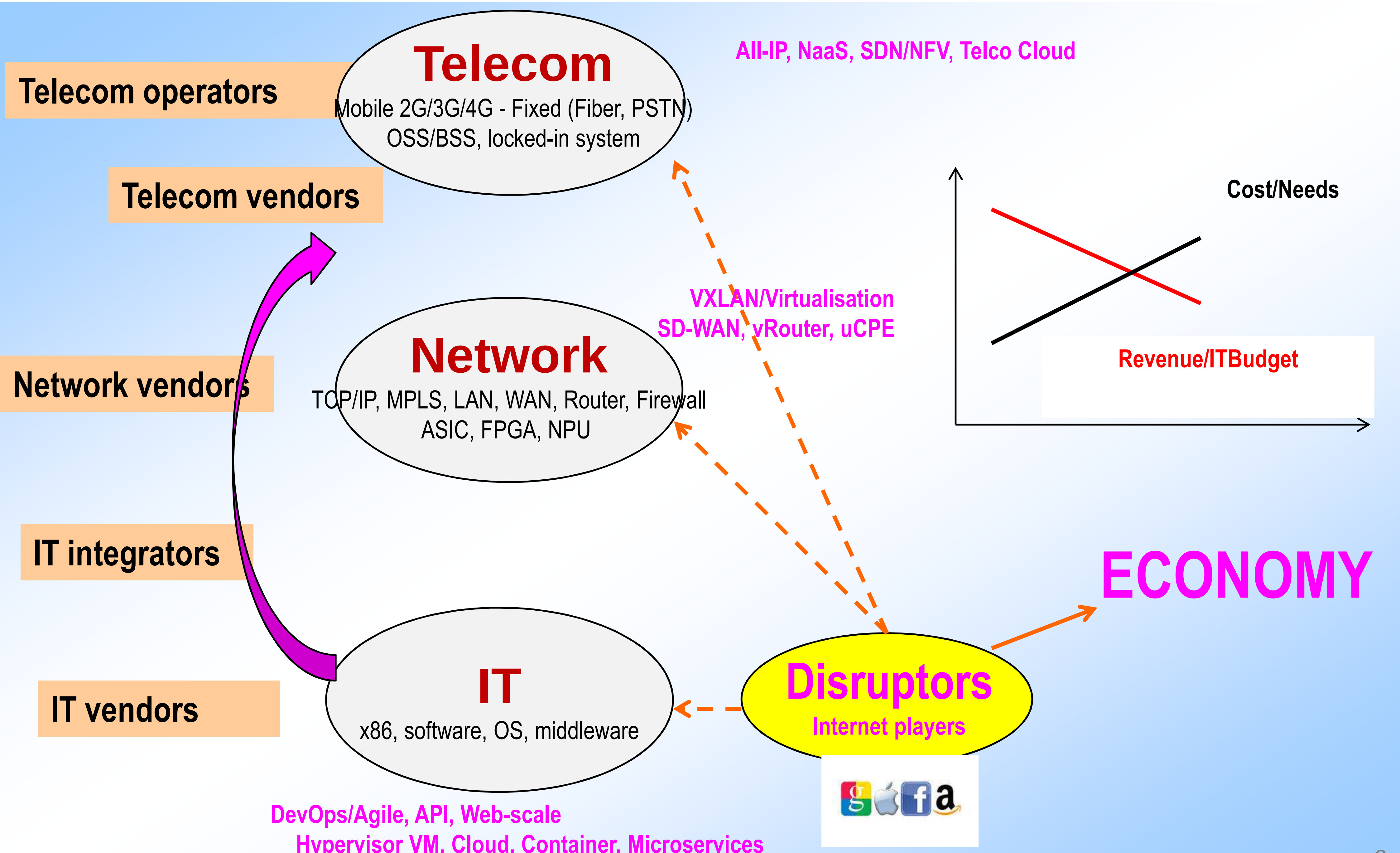
Actors

Disruptions



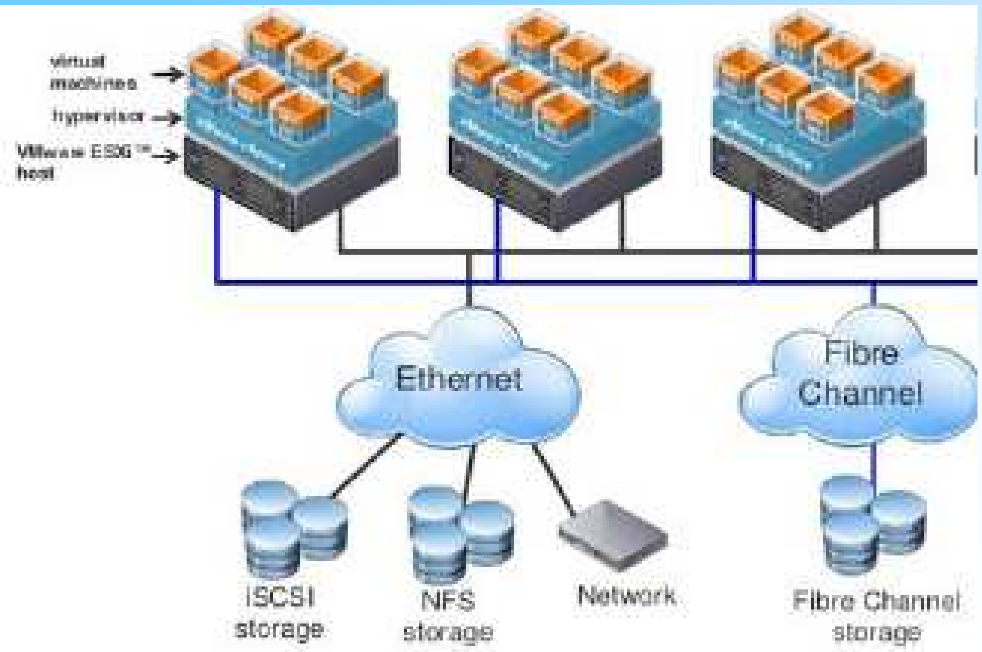
Challenges for Telecom Operators and the whole economic actors.

Telecom, Network, IT : commodities for Digital Transformation

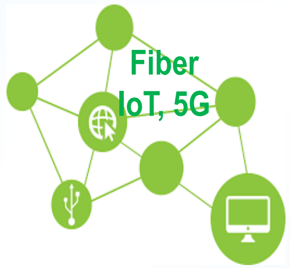


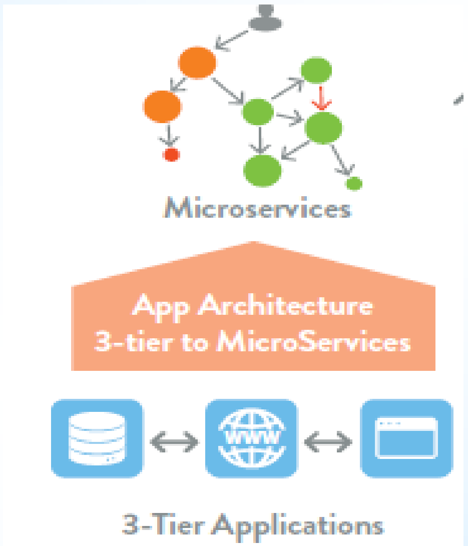
Digital Transformation > IT Transformation > Network Transformation

3-tier Traditional IT



Web-Scale IT, multi-cloud





BW, Latency
Flexible/SDx
QoS/QoE

Networks must match!

Content(s) from traditional Medias to Digital/@

SFR SPORT

at&t DIRECTV

Cdiscount

CINEMA

YouTube

f LIVE

UGC

User-Generated Content

YouTube TV


Google Chromecast

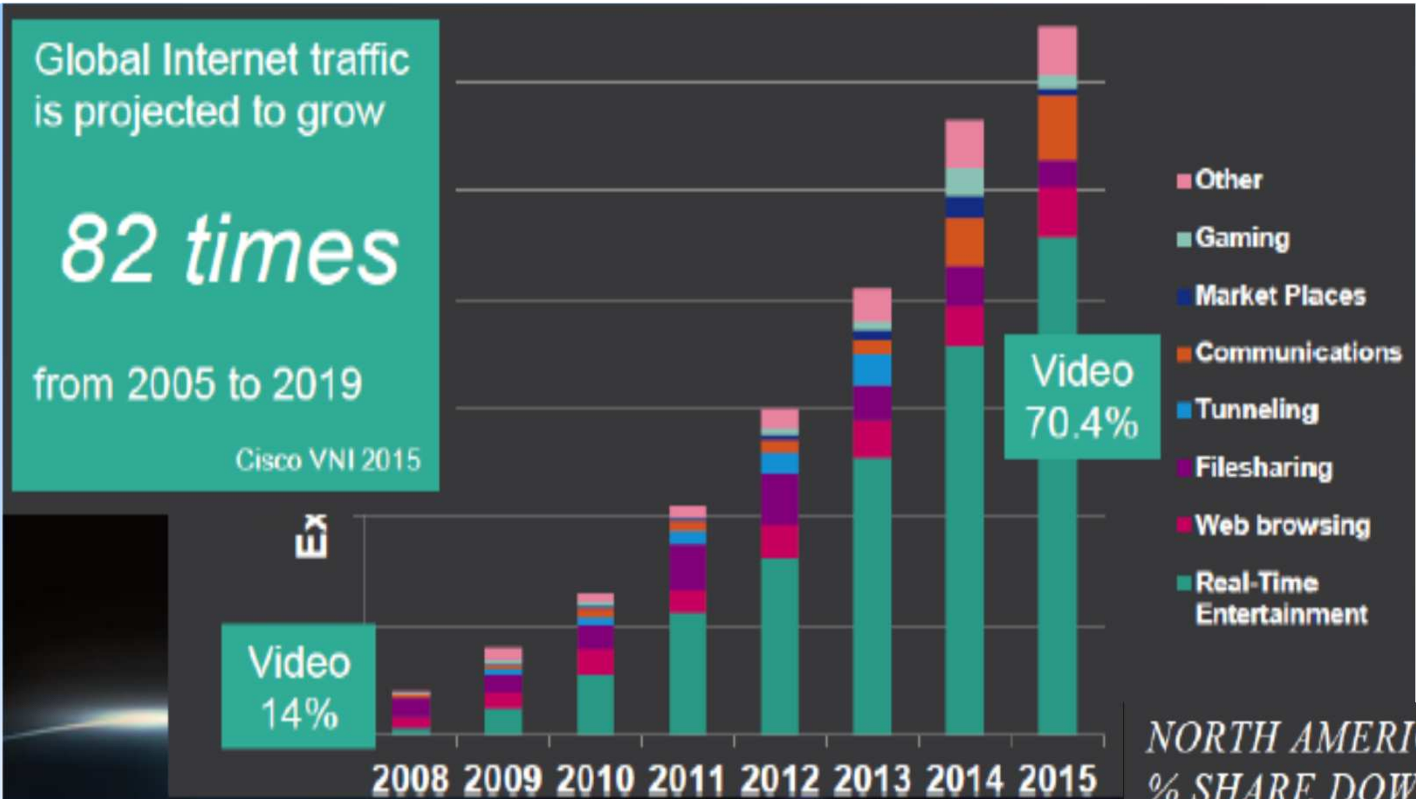
amazon video


Amazon Fire TV Stick

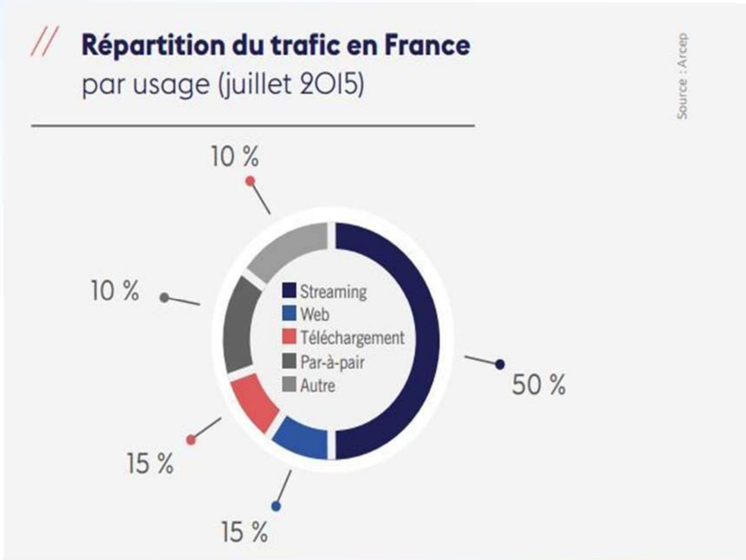
Apple TV

facebook watch

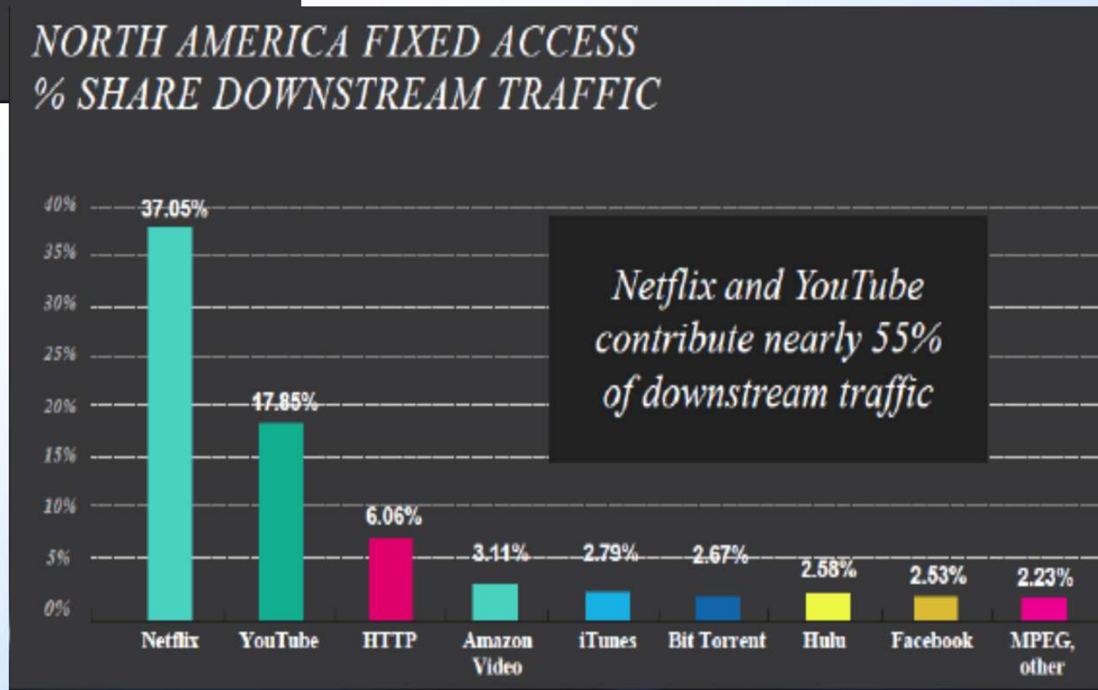
Traffic



Global Internet traffic is projected to grow
82 times
from 2005 to 2019
Cisco VNI 2015
Video 70.4%
Video 14%
Other
Gaming
Market Places
Communications
Tunneling
Filesharing
Web browsing
Real-Time Entertainment
2008
2009
2010
2011
2012
2013
2014
2015

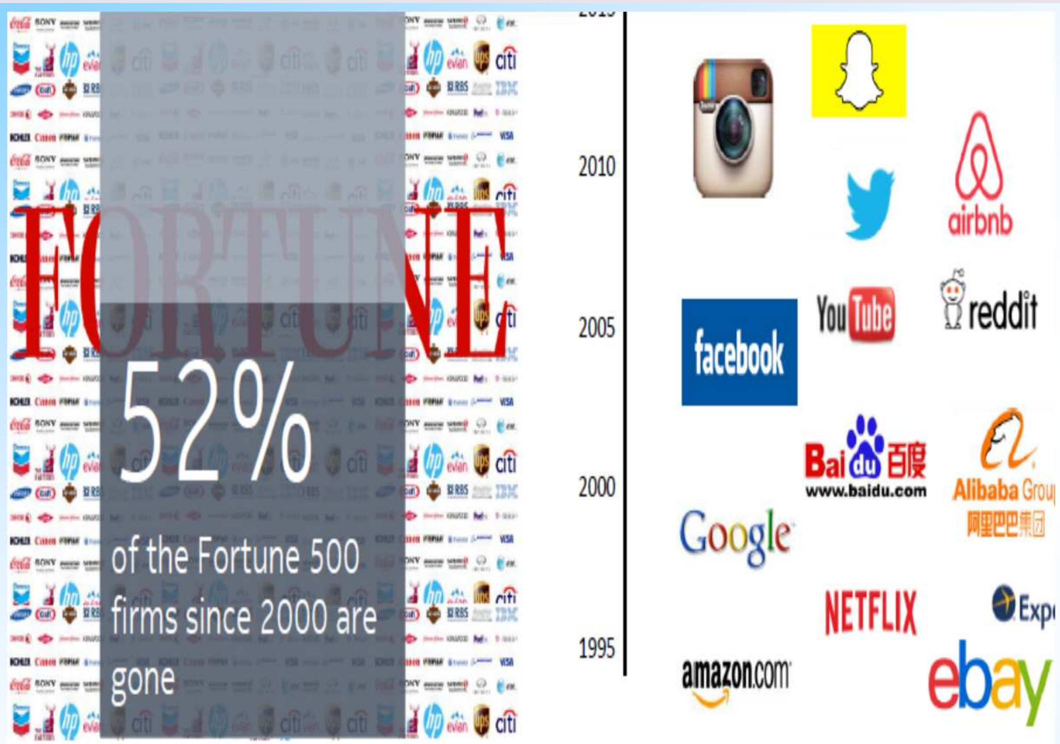


// Répartition du trafic en France
par usage (juillet 2015)
Source : Arcep
Streaming
Web
Téléchargement
Par-à-pair
Autre
50 %
15 %
15 %
10 %
10 %



NORTH AMERICA FIXED ACCESS
% SHARE DOWNSTREAM TRAFFIC
40%
35%
30%
25%
20%
15%
10%
5%
0%
37.05%
17.85%
6.06%
3.11%
2.79%
2.67%
2.58%
2.53%
2.23%
Netflix
YouTube
HTTP
Amazon Video
iTunes
Bit Torrent
Hulu
Facebook
MPEG, other
Netflix and YouTube contribute nearly 55% of downstream traffic

Digital Transformation challenges Disrupt or be Disrupted



Competitors are changing Companies must adapt to survive

Innovation m-payment, block chain, IoT/big data, IA..

towards sharing economy and disintermediation

Webscale companies are Cloud native businesses

operate on a massive scale and respond rapidly to change

use virtualized resources & infrastructure and can adapt quickly to customer demand

Transformé			En cours de Transformation			
Presse Livre Musique	UBER airbnb	Vidéo distribution Voyage	Santé / bien-être Banque Transport	institutions Agriculture Construction	Manufacture Assurance Service Publics	Légal / juridique Education Construction

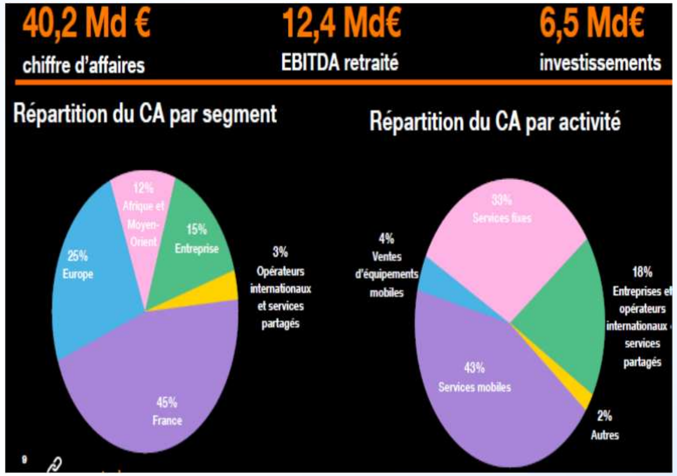
facebook Ads

Orange Digital Services Provider

Orange is a major network carrier, serving 260M customers in 30 countries and connecting 220 countries

Network all markets Fixed, Mobile, Entreprise, Wholesale

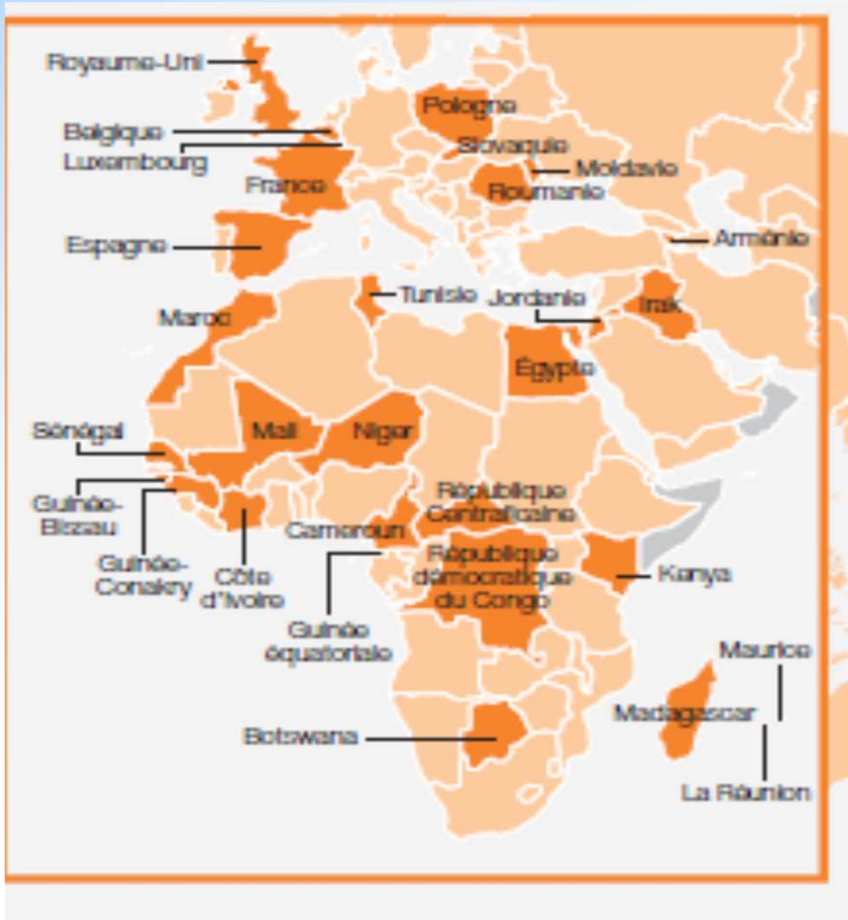
IT Cloud, Security, Big Data

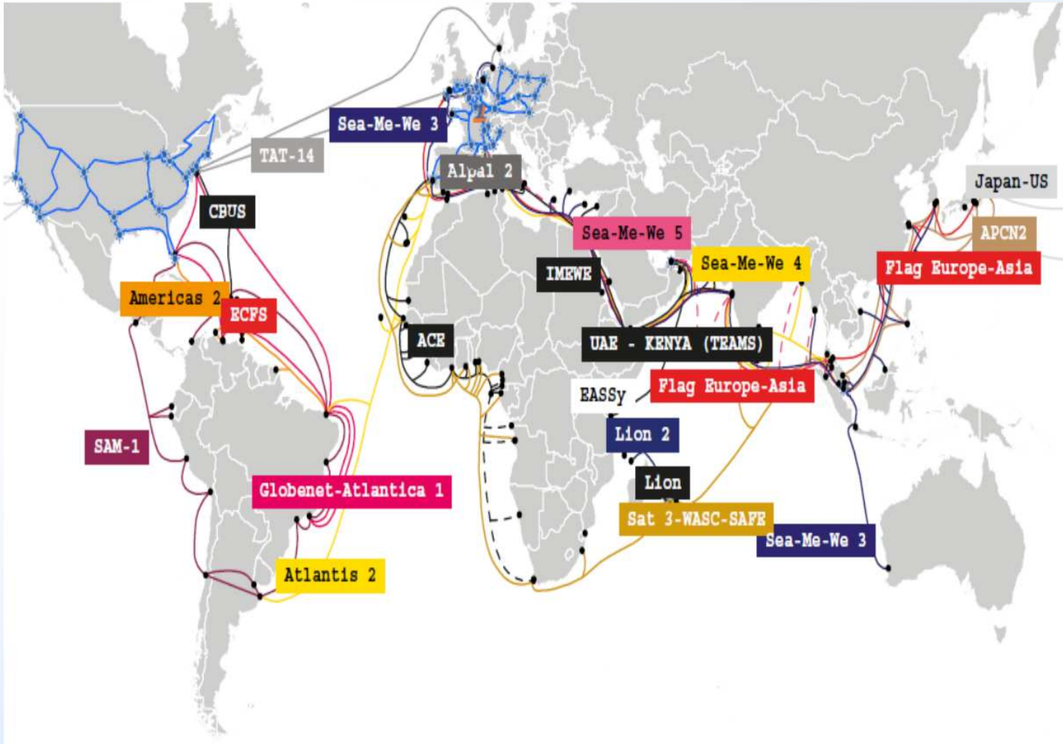


Strategy

Network VHB Fixed Mobile, QoS/QoE differenciation, All-IP, Network-on-Demand

Digital services mobile banking, IoT B2C (Connected home, Audio-visual) and B2B





Telcos Connectivity and Digital

Four types of growth pursued by telecoms operators

1 Connectivity
- Subscriber growth
- ARPU growth
- Connectivity for IoT

2 Extensions to core services
- TV/video content (AT&T)
- Smart home (SK Telecom)

3 New opportunities
- Security (Singtel)
- Advertising (Verizon)
- IoT beyond connectivity (Vodafone)

4 Venture capital investments
- Seed funds (Telefónica)
- Early stage venture capital investments (Verizon)

Source: Analysys Mason

Connectivity network transformation

Invesments fixed/mobile, QoS/QoE

Monetising network's use to prevent revenue going to OTT/hardware players

Digital services & transformation

- Mobile banking
- IoT B2C (Connected home, Audio-visual), B2B

Be the trust partner of customers' digital transformation

Figure 2: Strategic growth opportunities for selected telecoms operators, June 2017

Operator	Connectivity/FMC	Video/content	Enterprise IoT	Analytics	Consumer IoT	Security	Advertising	Financial services	Health	Ecommerce
AT&T	Stated strategic focus	Stated strategic focus	Stated strategic focus	Current activity	Current activity	Current activity	Stated strategic focus		Stated strategic focus	
Etisalat	Stated strategic focus	Stated strategic focus	Stated strategic focus	Stated strategic focus	Current activity	Stated strategic focus		Current activity		Current activity
Orange	Stated strategic focus	Stated strategic focus	Current activity	Current activity	Current activity	Current activity		Stated strategic focus	Current activity	
SK Telecom	Stated strategic focus	Stated strategic focus	Stated strategic focus	Stated strategic focus	Stated strategic focus		Current activity	Current activity	Current activity	Stated strategic focus
Singtel	Stated strategic focus	Stated strategic focus	Current activity	Stated strategic focus	Current activity	Stated strategic focus	Stated strategic focus	Current activity		
T-Mobile	Stated strategic focus	Stated strategic focus	Stated strategic focus	Stated strategic focus	Current activity	Stated strategic focus	Stated strategic focus		Current activity	
Telefónica	Stated strategic focus	Stated strategic focus	Stated strategic focus	Stated strategic focus	Current activity	Stated strategic focus	Stated strategic focus		Current activity	
Telenor	Stated strategic focus	Current activity	Stated strategic focus	Stated strategic focus	Stated strategic focus		Current activity	Stated strategic focus		Current activity
Telstra	Stated strategic focus	Stated strategic focus	Stated strategic focus		Current activity	Stated strategic focus			Stated strategic focus	
Turkcell	Stated strategic focus	Stated strategic focus	Current activity		Current activity		Current activity	Stated strategic focus		
Verizon	Stated strategic focus	Stated strategic focus	Stated strategic focus	Stated strategic focus	Current activity	Current activity	Stated strategic focus			
Vodafone	Stated strategic focus	Current activity	Stated strategic focus	Stated strategic focus	Stated strategic focus	Stated strategic focus		Current activity	Current activity	

Key: Stated strategic focus | Current activity

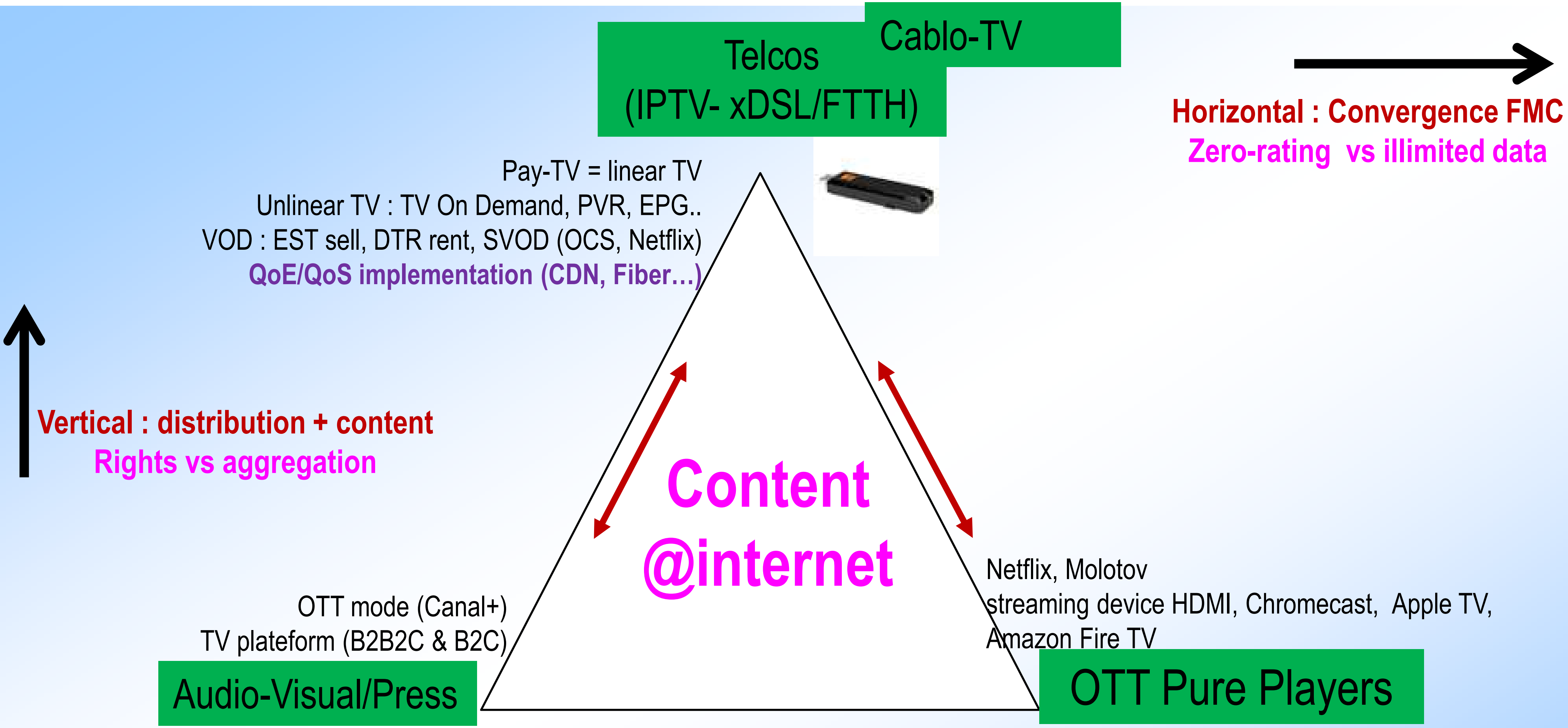
Source: Analysys Mason

Network and IT Convergence, illustration

Content

New technologies and Business Models

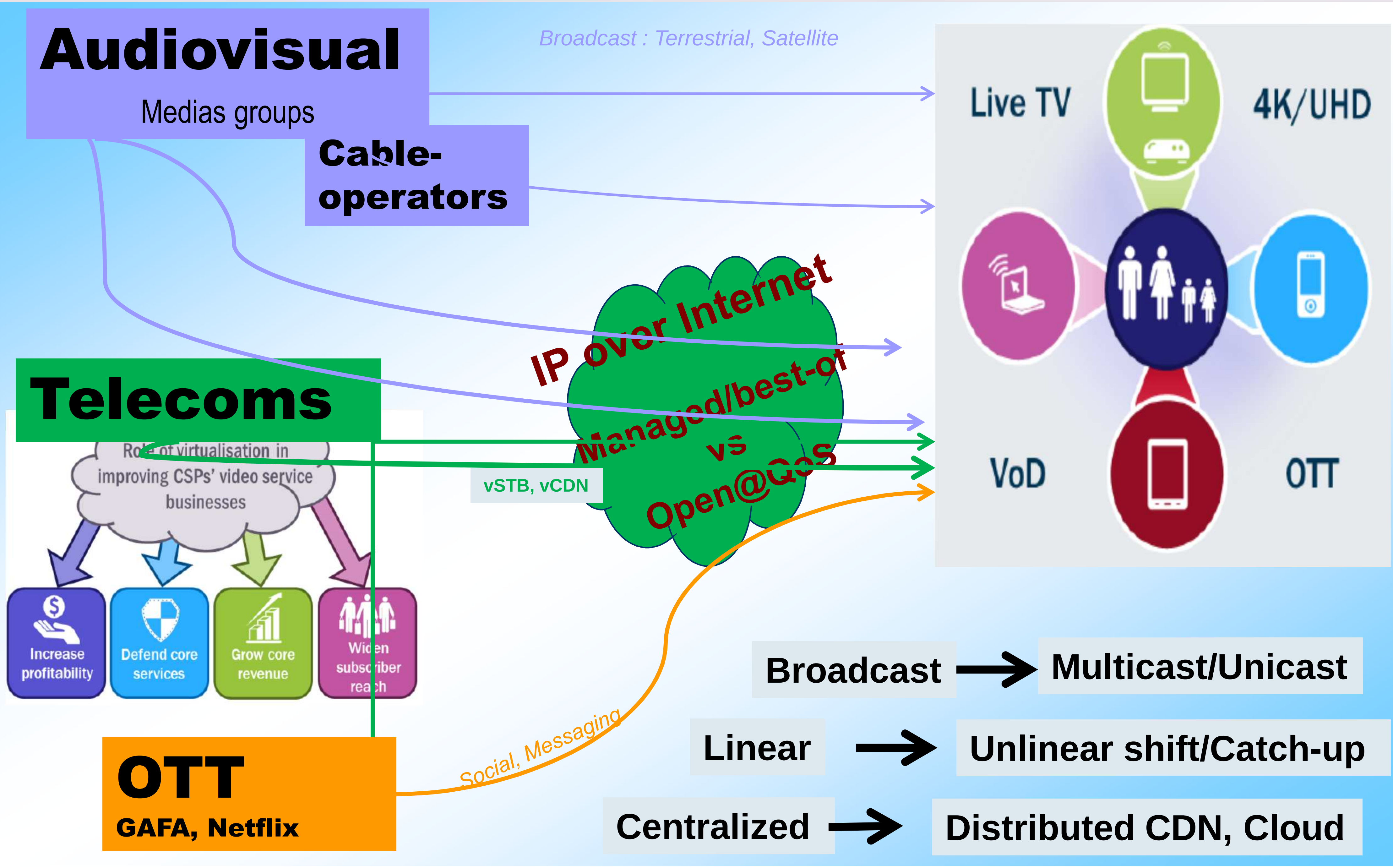
The current revolution : Digitale economy, worldwide competition



Convergence to OTT mode with target to control Users & Home

- Audio-Visual : high cost, closed value chain
- Telcos/Cable : distribution + premium
- Pure players (OTT, MCN, UGC) : lower cost and agile, data-driven, very dispatched audience

Media - Telecom - IT convergence : audiovisual evolution



Use case : vidéo Over-the-Top

Medias under pressure, decreasing revenues & subscription

- Internet TV (IPTV) increases , users behaviour to watch TV ‘ATAWAD’
- Press readers decrease, Video services increasingly competitive with alternative streaming services by OTT

Telecom operators under pressure : no more growth, but..

- Growing costs of network traffic, delivery and content acquisition
- Broadcast to multicast/unicast and UHD content (4K/8K/HDR) raising capex/opex

OTT video provide cost-competitive, multi-screen on-demand services with exclusive original content

- OTT TV in the beginning simple and complément of TV
- OTT TV 2.0 : high requirement in quality/interactivity, devices flexibility, customised dynamic Ads
- No buffering/latency , quick start => higher Ads view-time, e-commerce transaction & subscription

Content owner : win

TV : loss (OTT, IPTV)

Telecom : growing costs

Users : low-cost, free

Netflix Telcos vs OTT

OTT

Over-The-Top, e.g without ISP/Telecom carriers participation in the control & content distribution

Use the internet to offer services to users device (so far supplied by Telecom carriers as SMS, voice, VPN)

Consumers can get OTT services by all devices connected to Internet : PC, smartphones, tab, smartTV..

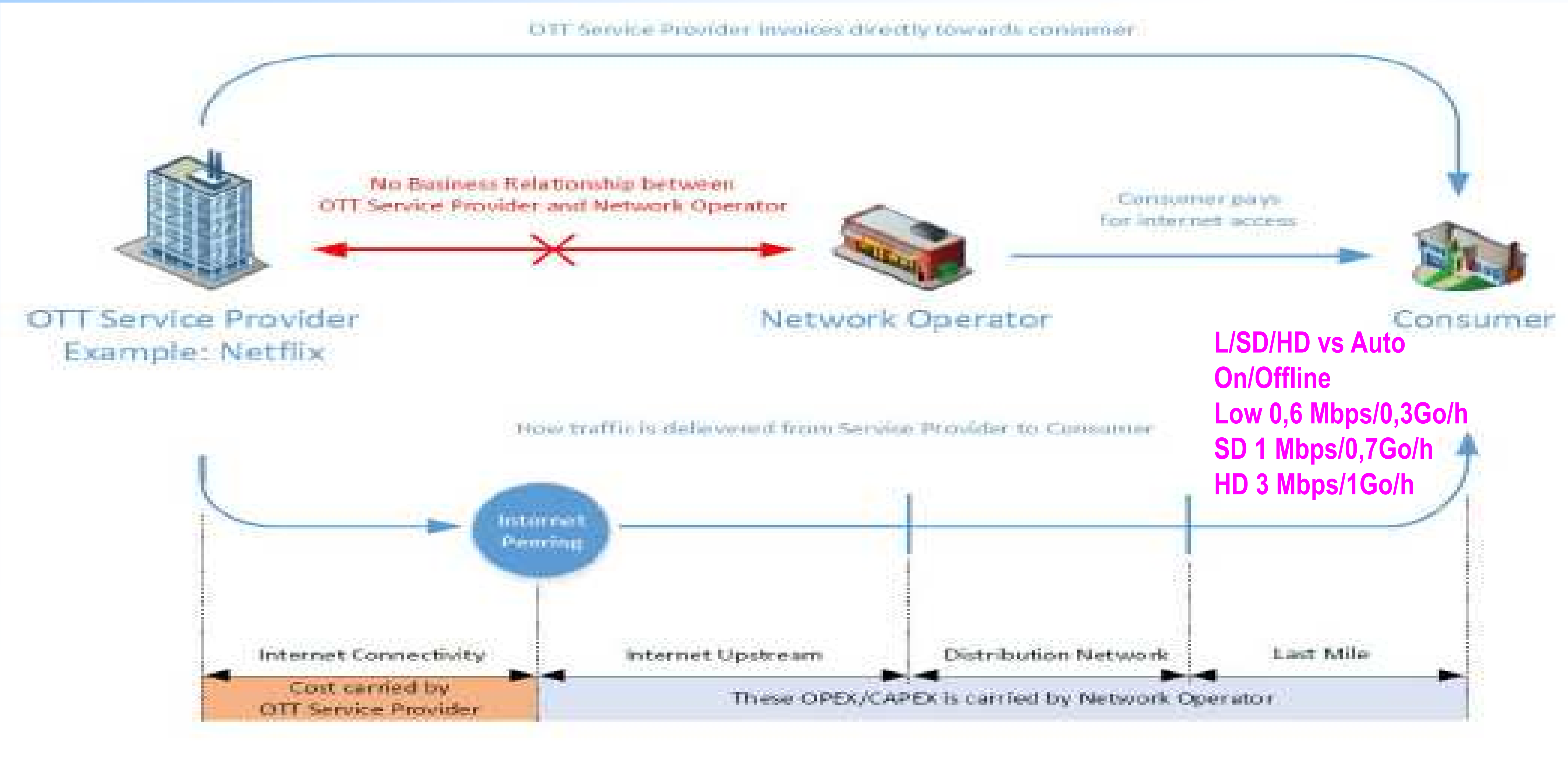
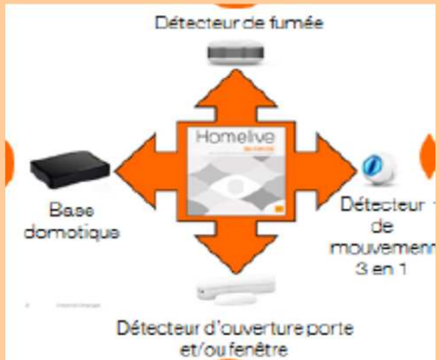


Figure 1: OTT Business Relations and Traffic Flow. Source: Ocilion

Fixed and Mobile Convergence – Mass market

Quadrup-play : internet - telephony - TV/Video - Mobile

5-Play : OTT Services

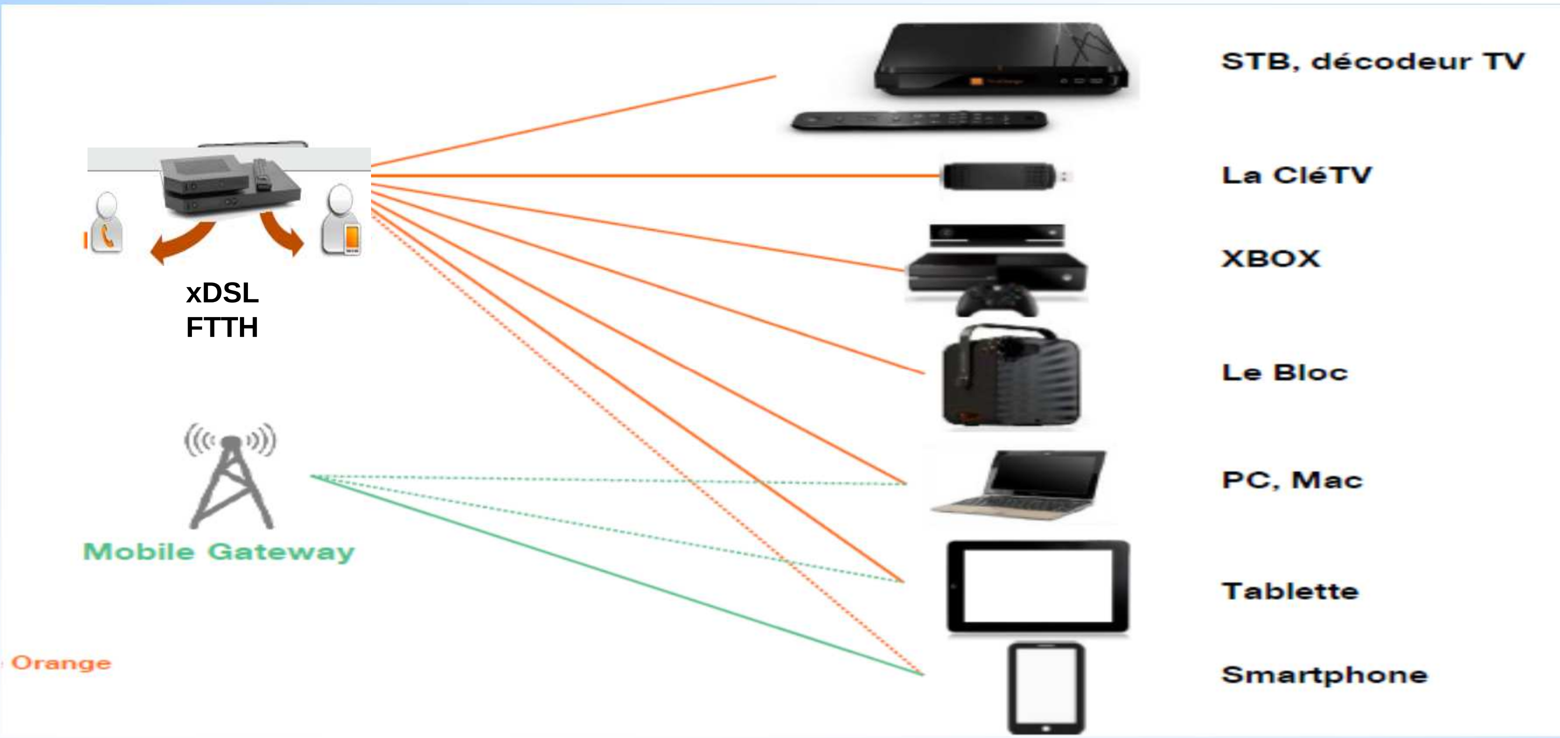


Fixed Mobile Convergence Open quad-play

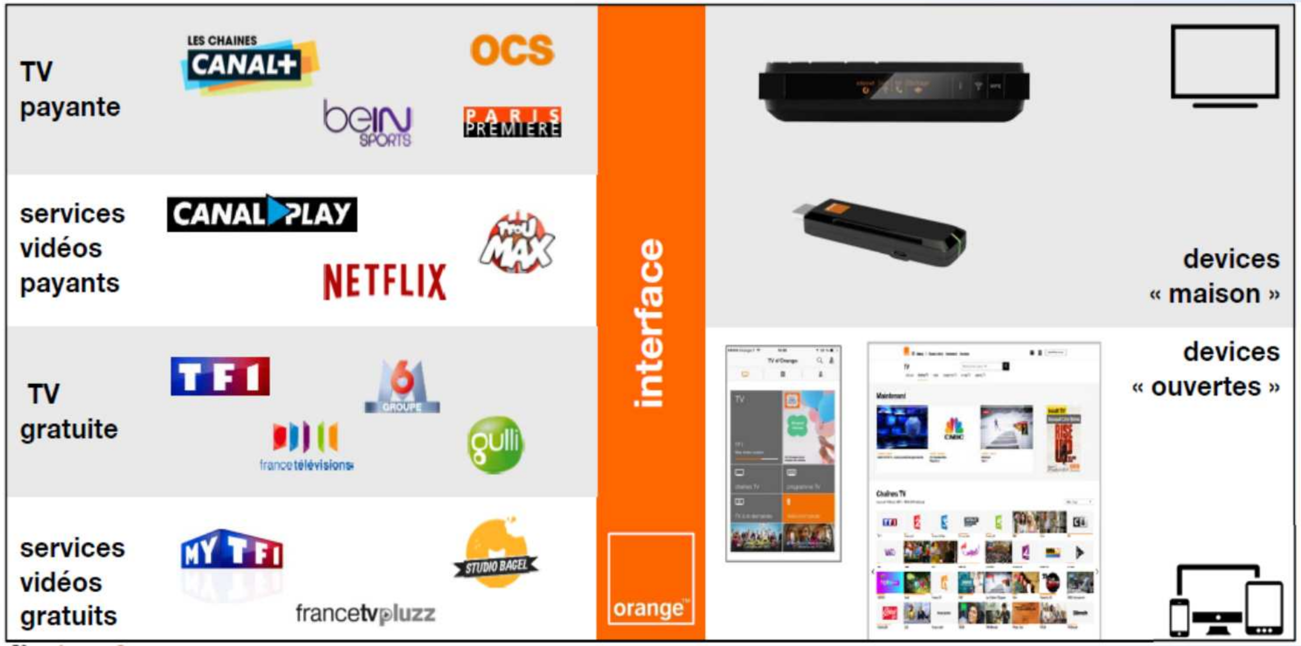
Internet Wi-Fi in/outdoor
- xDSL 28 Mbps
- Fibre 100-200-500 Mbps

Telephony VoIP

Mobile 4G n-CA 150 Mbps



IPTV
- TV multiscreen (up to 3)
- Linear, Unlinear, Streaming ATAWAD
- Managed and OTT



Towards smart Life

Quadrup-play QoE

Femtocell

3G/4G coverage extension, up to 8 mobiles in 20m
Connected to Livebox, voice call tranportation by ADSL

Airbox 4G/Wi-Fi

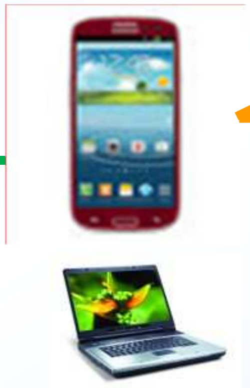
Better reliability

Fixed
9,6M clients DSL
1,8M clients FTTH

WiFi HOTSPOT

Mobile 29M (8M in 4G)

out of home



3G/4G + femto

Fiber to the home
xDSL

8M clients TV d'Orange

orange.fr
TV d'Orange
Cloud d'Orange
Livephone d'Orange
Deezer
homelive

10M clients VOIP (9 Residential + 1 Pro)

Telcos vs Cable operator FMC + Content

HomeLan
4-Play : IPTV/VOIP/@/mobile
Unified interface TV, Cloud, mail…
Wifi, GbEth, Femtocell, VoWifi

DSL Modem
ONT

Telephone cable native 15db/km
ADSL/VDSL/G.fast 4Khz - 100 Mhz

Optic fiber 0,2db/km

DSLAM

OLT

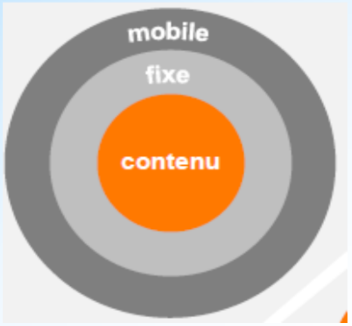
ADSL > VDSL > FTTN
FTTH

1Gps

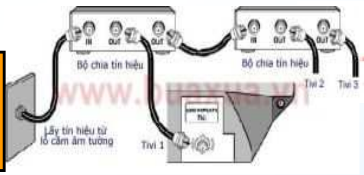
HFC => FTTLA/Docsis

ARPU

Fixed : 4-play	
Mobile : data	



Cable Modem

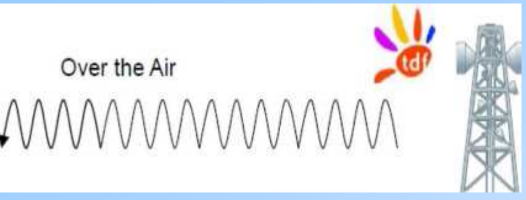


TV Cable native

RF Ampli / Fiber Node

CMTS
Docsis 2>3.0>3.1

IPTV monetisation and customer fidelity



Cable

TV over DSL or FTTx

<table>
<tr><th>Medias</th><th>Terrestrial</th><th>Satellite</th><th>Cable TV</th><th>Telecom IPTV/webTV/OTT</th></tr>
<tr><td>Diffusion modes</td><td>Broadcast DVB-T2, no upstream</td><td>Broadcast no upstream</td><td>Broadcast native in DVB-C
DOCSIS for Internet</td><td>IP protocol via IP network or Internet
Broadcast/Multicast/Unicast</td></tr>
<tr><td>View mode</td><td>Linear TV (scheduled TV)</td><td>Linear TV</td><td colspan="2" rowspan="2">Managed :
• linear TV multiscreen, Catch-up, Shift, Record, VoD/SVoD
• contents defined by operator and restricted to its clients

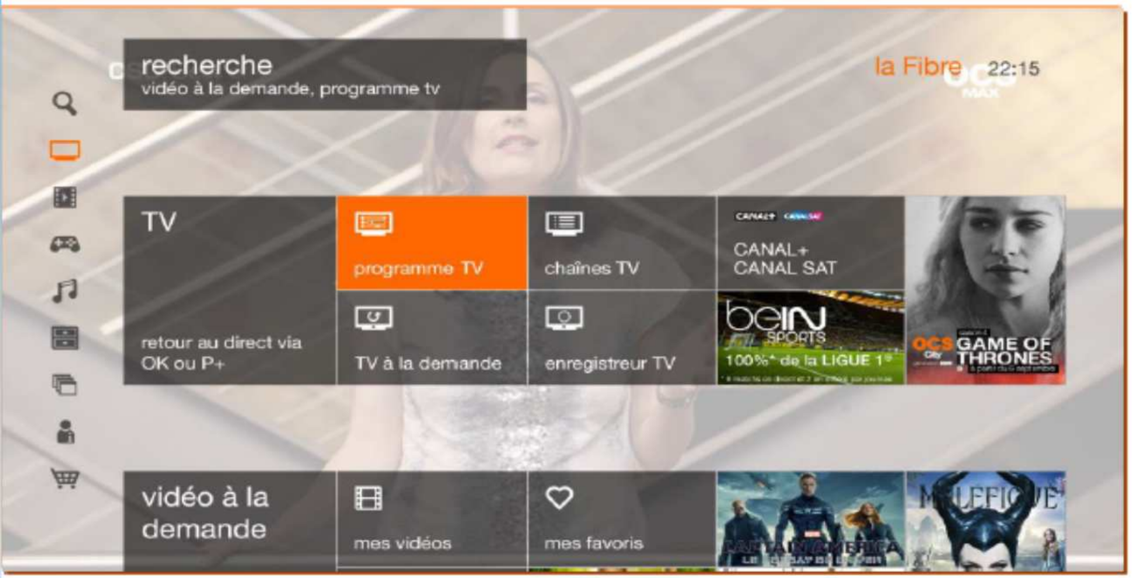
open Internet : the same without Tvbox (plus smartTV, AppleTV, GoogleTV…) but concerns on network resources, QoE/S, revenue</td></tr>
<tr><td>QoS/QoE</td><td>Managed
end-to-end QoS delivery</td><td>Managed
end-to-end QoS delivery</td></tr>
</table>

IT convergence

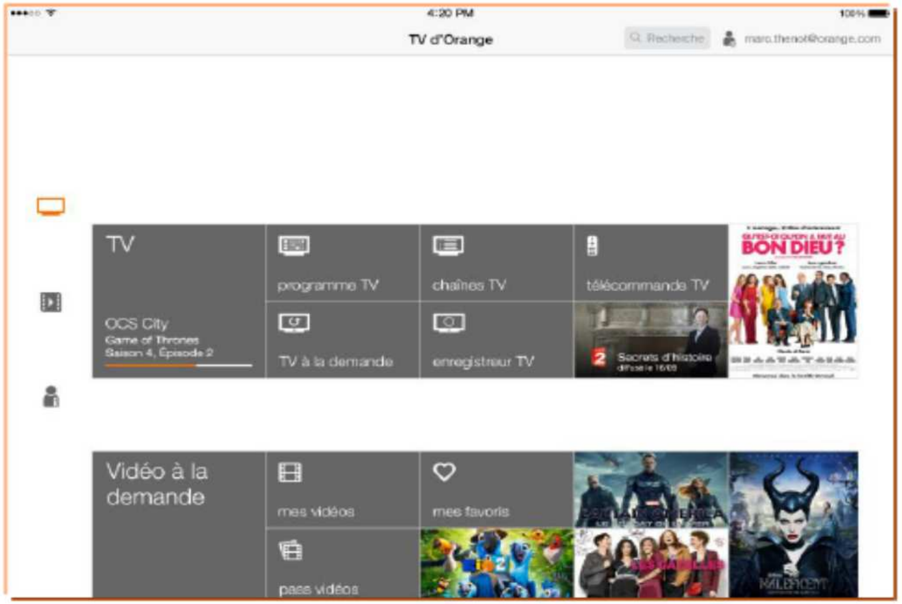
- Multiplicity of Video formats and devices, Adaptative bitrate and CDN to assure QoS
- Internet fixed/mobile connectivity & speed, VDSL/G.fast, FTTH, DOCSIS over cable, LTE
- User’s data is key for QoE & to make money (Ad, Yield management..)

FMC Content everywhere

TV, photo, music, data, mail > TV, smartphone, lap, tablet

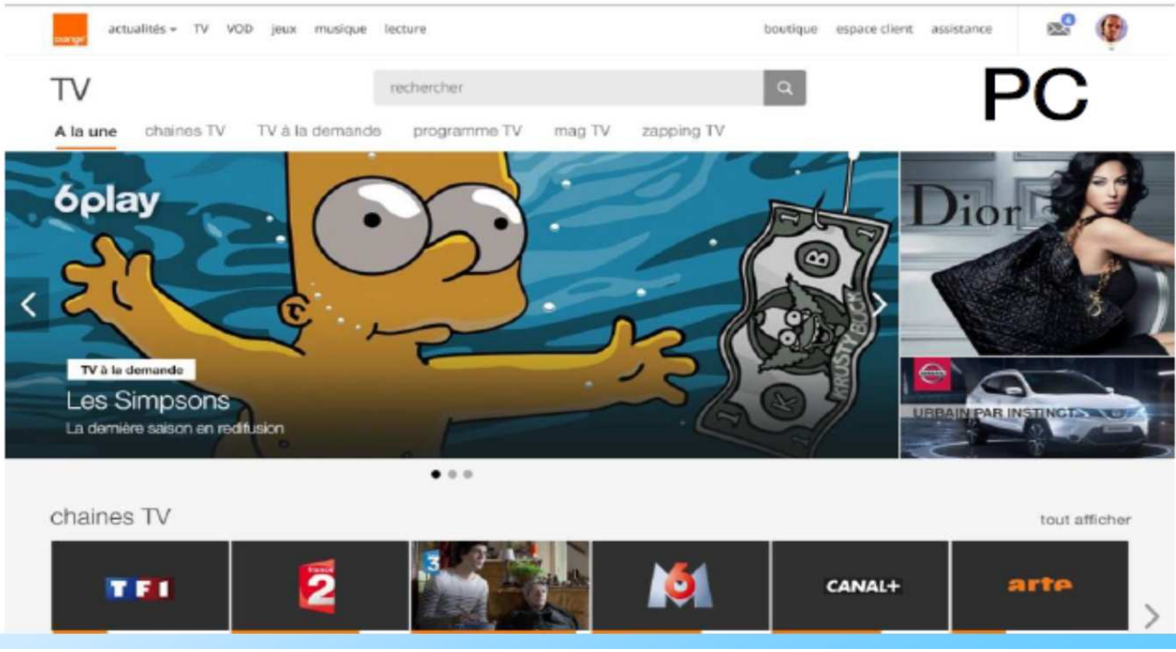


TV



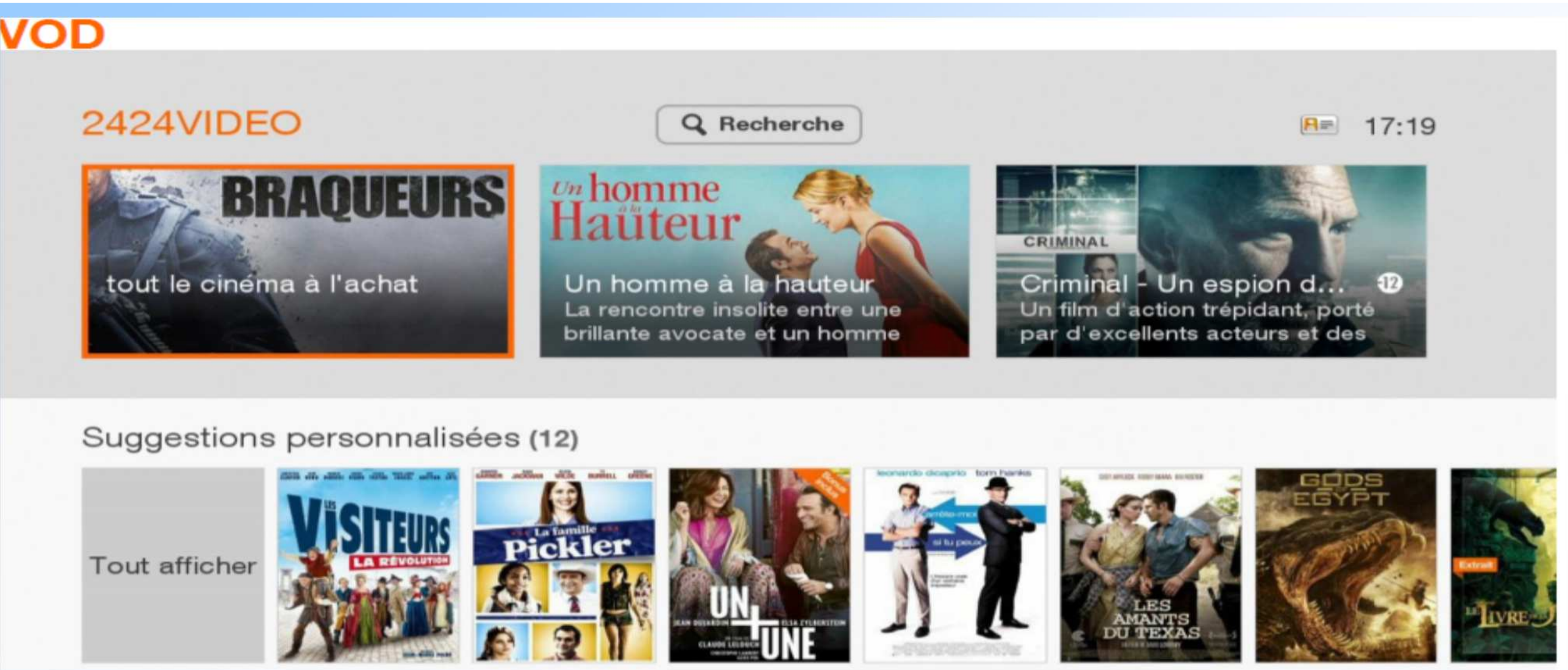
Tablette

Smartphone

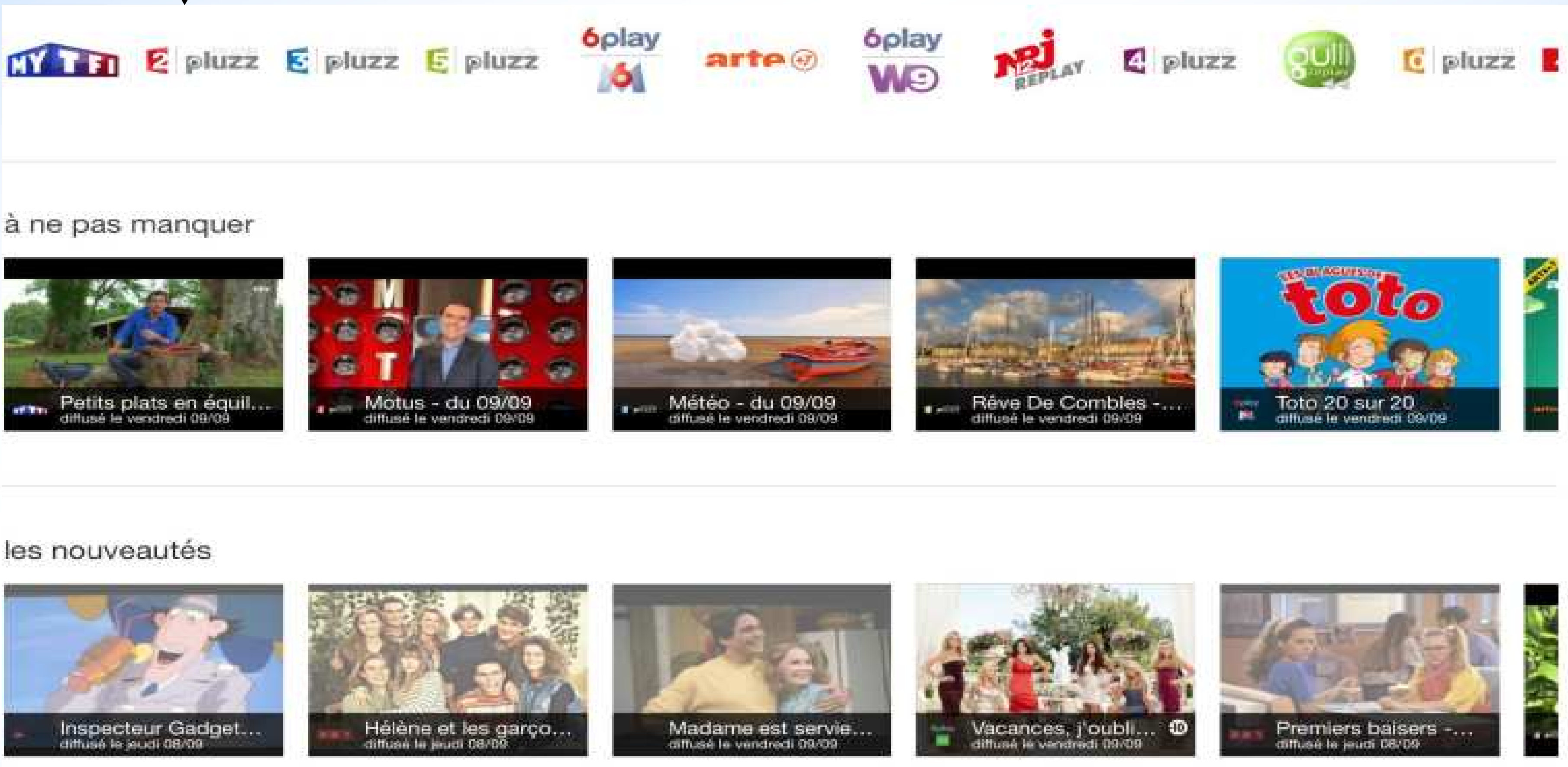


PC

Video On Demand controled by TV box

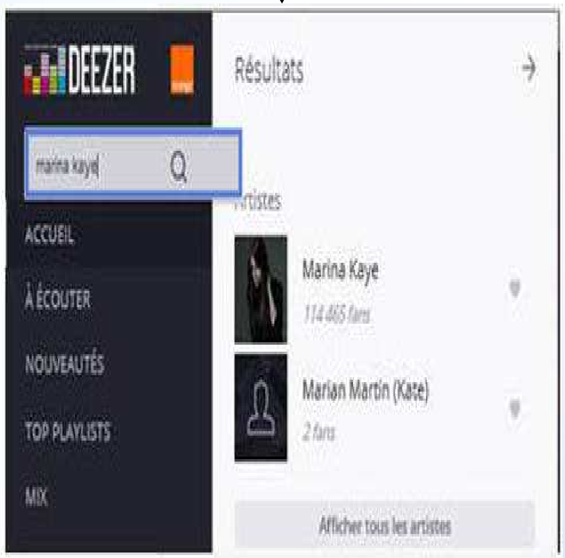


Replay/Catch-up TV and PVR controlled by TV box

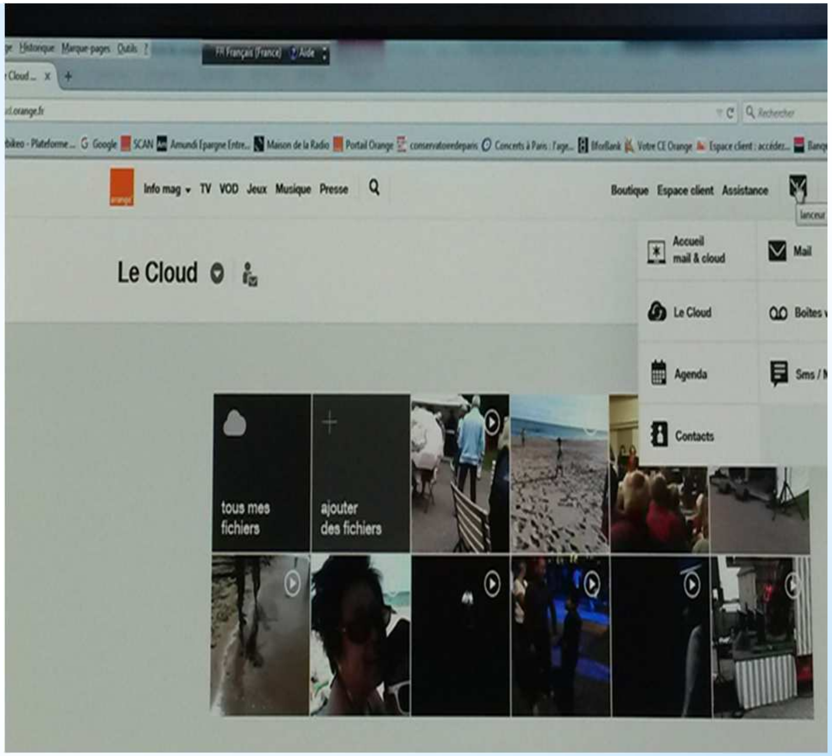


FMC : Cloud multi-screen

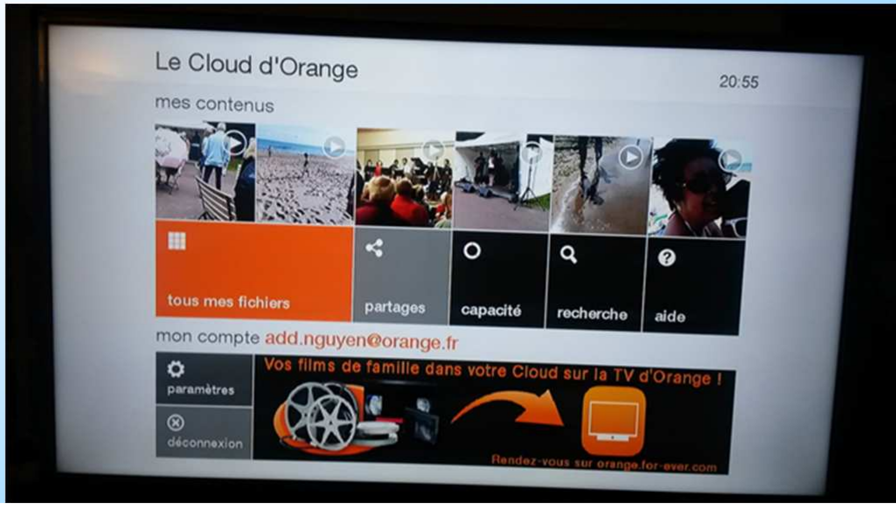
smartphone



Lap PC



TV



5th-play : Homelive

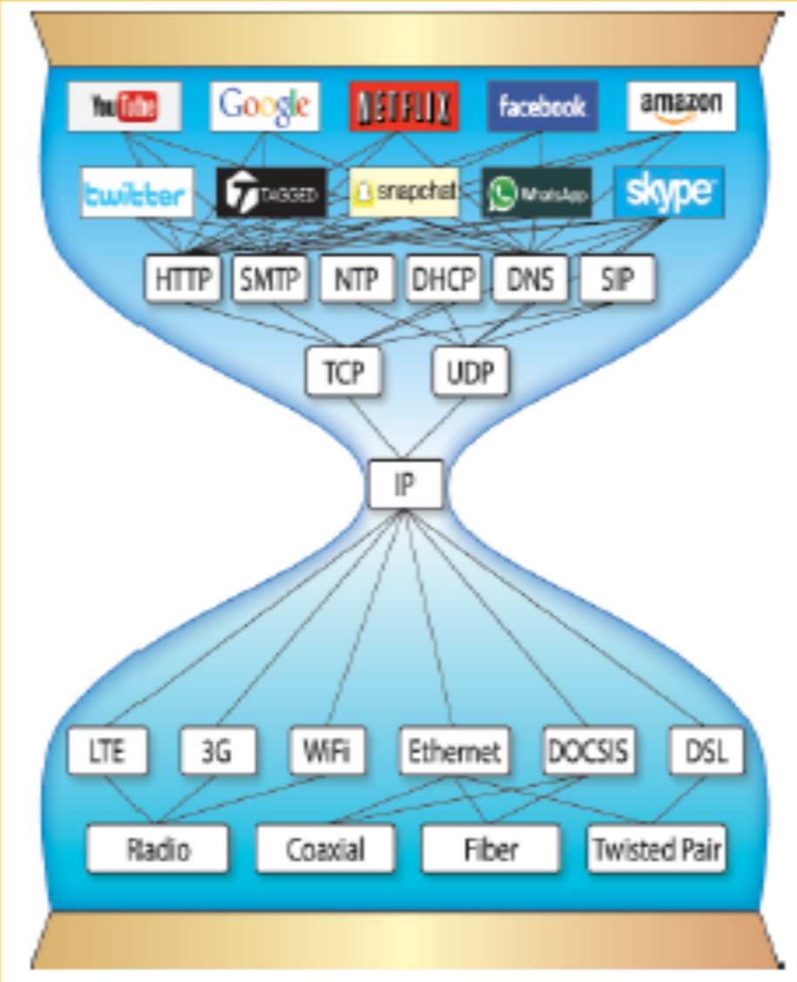
Homelive d'Orange en mode 'OTT' pour une maison bien surveillée et mieux protégée

abonnement
9,99 € / mois

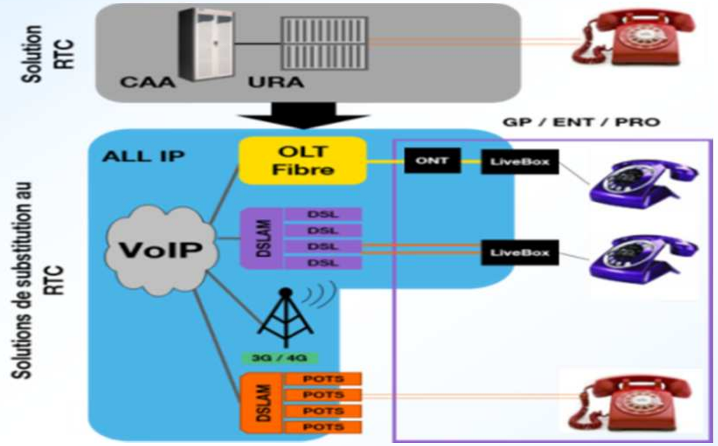
- application de pilotage sur ordinateur, tablette et smartphone
- alertes SMS en illimités connexion (carte SIM 2G), hotline d'assistance dédiée
- Cloud : possibilité de sauvegarder les vidéos et les photos

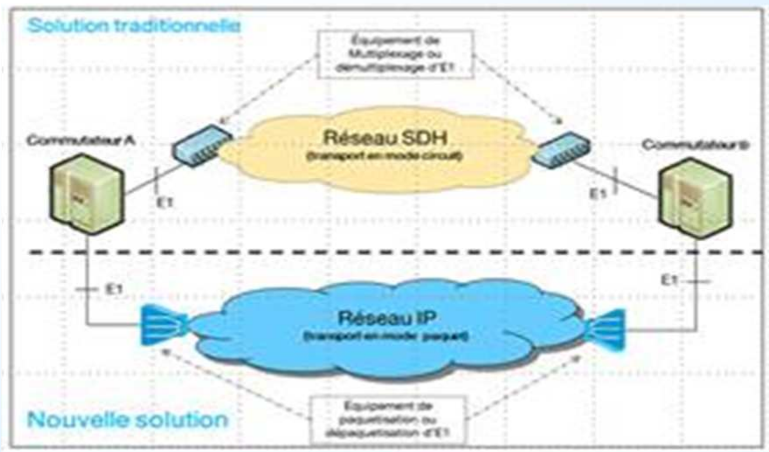
protocole z-wave compatible objet/box tiers

Quel(s) réseau(x) pour transporter quel(s) contenu(s)



Legacy networks towards ALL-IP





TV Broadcast
- Terrestrial
- Cable TV
- Satelite

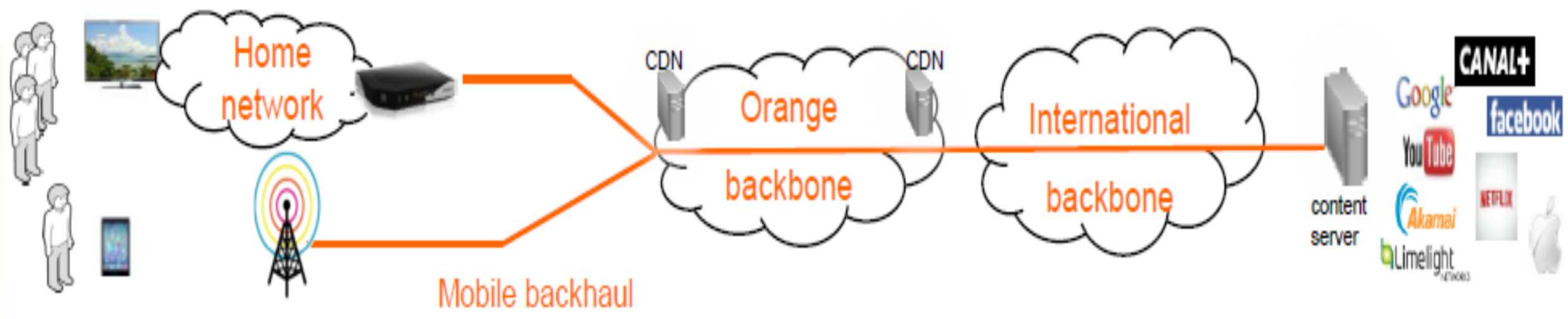
Data &Transmission (IT)
- X25, FR, ATM, LL
- ISDN/RNIS

Telephony
- PSTN/RTC
- PABX

Mobile
- TDM

Legacy technologies do not evolve, no industry effort then not scale for traffic growth

- New features are not supported (e.g. no support of HD voice in PSTN and 2G mobile networks)
- Legacy technologies raise issues for business continuity risk management
- Operational costs lower in IP-based technologies



a full set of technologies
used to connect customers

higher throughputs

increased volumes

new requirements (e.g. latency)

at home
- **FTTHome** — GPON > XGS-PON > NG2-PON
- **FTTdp + G.Fast**
- **FTTc + VDSL**
- **hybrid DSL + LTE**
- **xDSL**
- **LTE** — LTE-Advanced > 5G

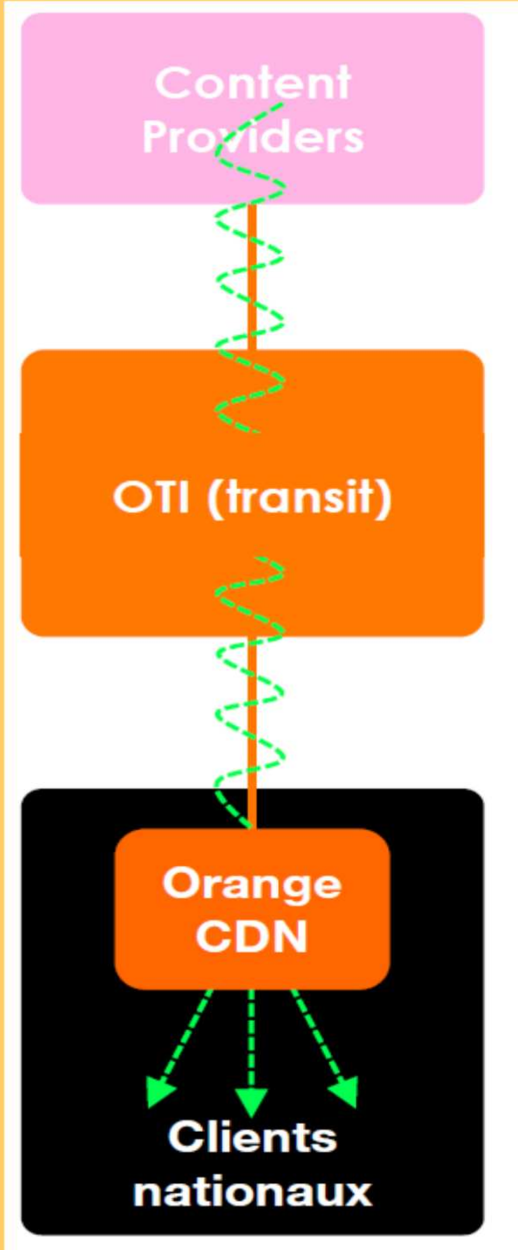
on the move ← **LTE**

for IoT ← **LoRa** **LTE-M**

last meter at home, in office and in hot spots ← **Wifi**

Content Delivery Network

Bandwidth (cost)
Jitter (QoS)
Latency (QoE)



Content Delivery Network

What is Content Delivery Network ?

- Structured caching system, e.g. distributed servers allowing contents to be appropriatetly located and distributed to users for
  - better QoE : reduce E2E latence
  - optimize bandwidth in core network & peering PoP

Why implement it ?

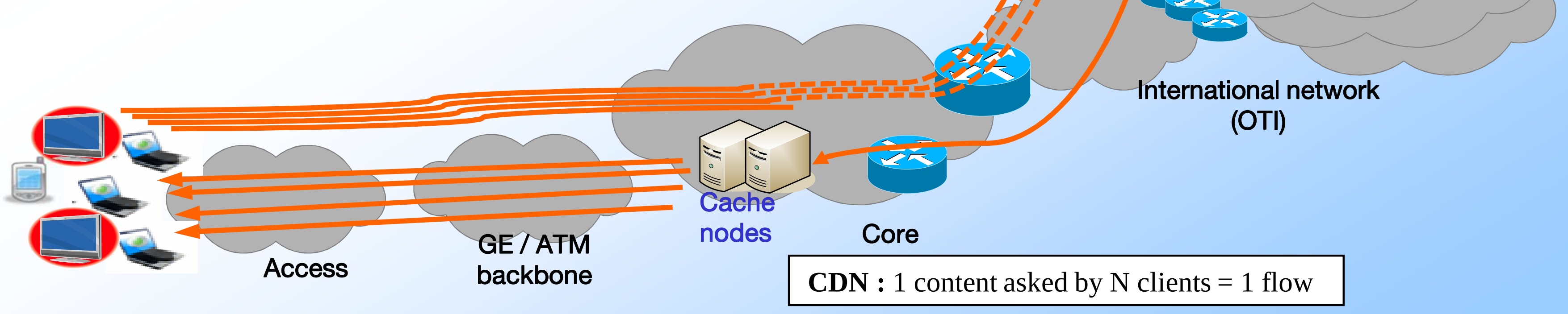
- Growth of video content & data : bandwidth & content servers capacities hardly challenged
- Network carriers want to money network in 2-sided business model
  - revenue from content providers (wholesale)
  - revenue from users via differentiated offers (retail)

Key CDN Applications

- video delivery
- bandwidth optimisation
- web sites response time acceleration *(e.g. e-commerce support)*

Implementation models

- CDN (2-sided)
  - Push : driven by CDN operator
  - Pull : driven by customer + LRU
  - Live : continous flow
- Transparent Caching (no revenue)
  - P2P : BitTorrent, eDonkey, Ares
  - HTTP ,(efficiency is moderated because of HTTPs)

CDN Actors & markets

- CDN Service Provider *Akamai, limelight, Edgecast, Level3,* … with turn-key CDN offer
- CDP *Cisco, Motorola, Verivue, Huaweï,* … address to CDN carriers as Orange, BT
  - Orange uses CDN for Audio-visual services for fixed & mobile Network : IPTV, Web TV
  - Orange is CDN carrier to address content providers, , e-commerce (bundled with internet connectivity, cloud computing, VPN ...)
- Cache ***Peer-App, Oversi,*** … optimisation solution for OTT traffic, TV/VoD

To take away

1

Digital + @ fixe/mobile

=

Disruptive business models
TV/xVoD
Managed vs OTT

2

Requires quality networks

High speed
QoS/QoE
Optimisation (CDN, Peering)

Merci!