

Operators' demands, practices and expectations for full fibre connection and network evolution

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Who We Are



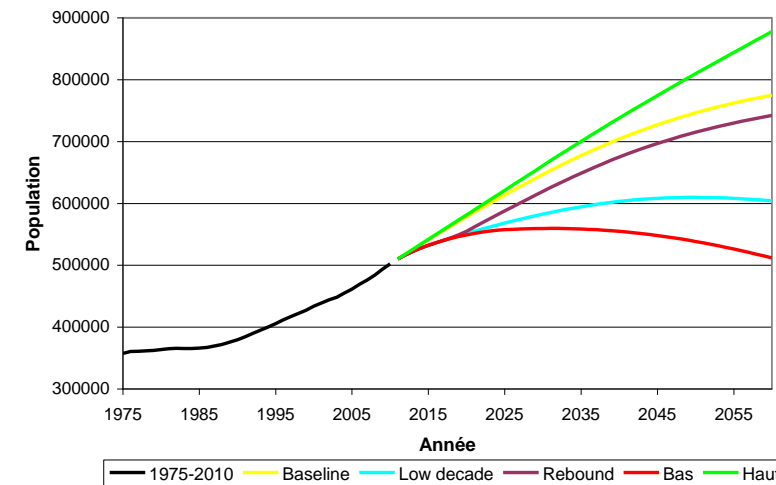
600-700k population

Historical operator (fixe/mobile)

81% fiber coverage

500Mbps Mass Market Internet

Access currently deployed in XGSPON technology



Source : STATEC

Evolution Of Operators



Mature market sector in Europe

Consolidated market in each country

Erosion of commercial margins

Increase of operational costs

→ Decrease of R&D power

Technological Trends & Evolution

Network Technologies Evolution

PON 10G → 25G → 50G-PON → ITU
→ Coherent PON? 100G PON?
OTN → Sub-1G OTN, OSU-flex
Core → SRv6, slicing, ...

Green Network

NRJ Efficiency
Sustainable
Infrastructure

Artificial Intelligence

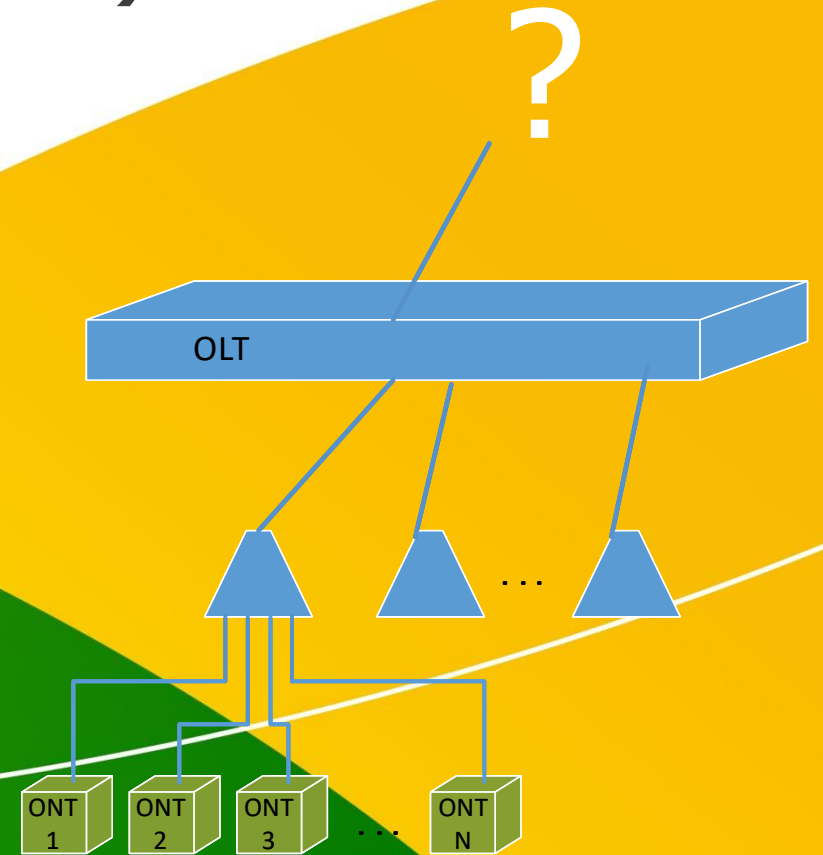
Large Language Models LLM
Deep Neural Networks
Foundations Models
Self-supervised learning

New Services

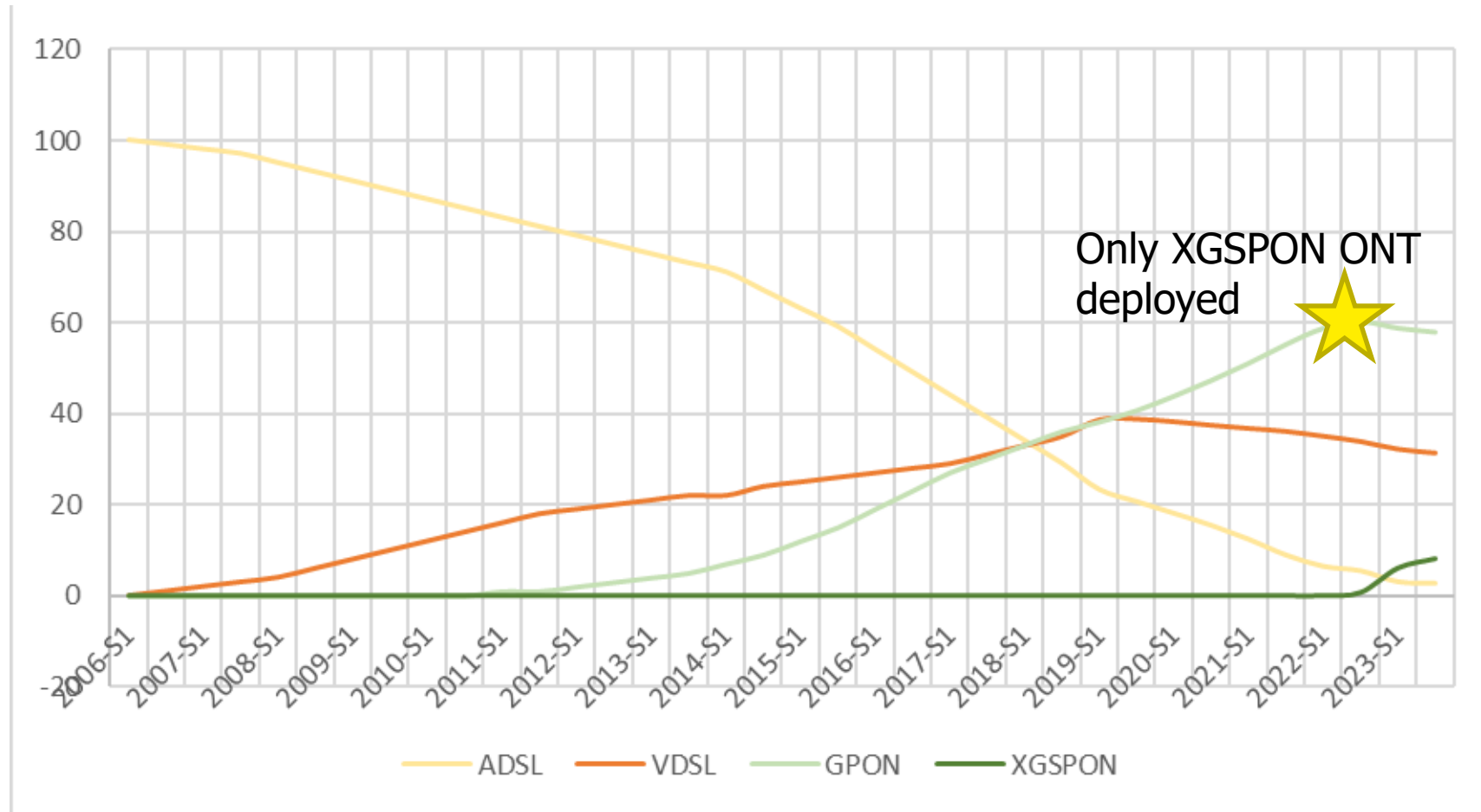
Cloud-based services
Online Gaming
IoT services
Augmented reality



Possible Evolution of Access Network Requirements (POST use case)



Last 16 Years of Access Network Evolution



7% of network technology shift per year

Only XGSPON ONT deployed



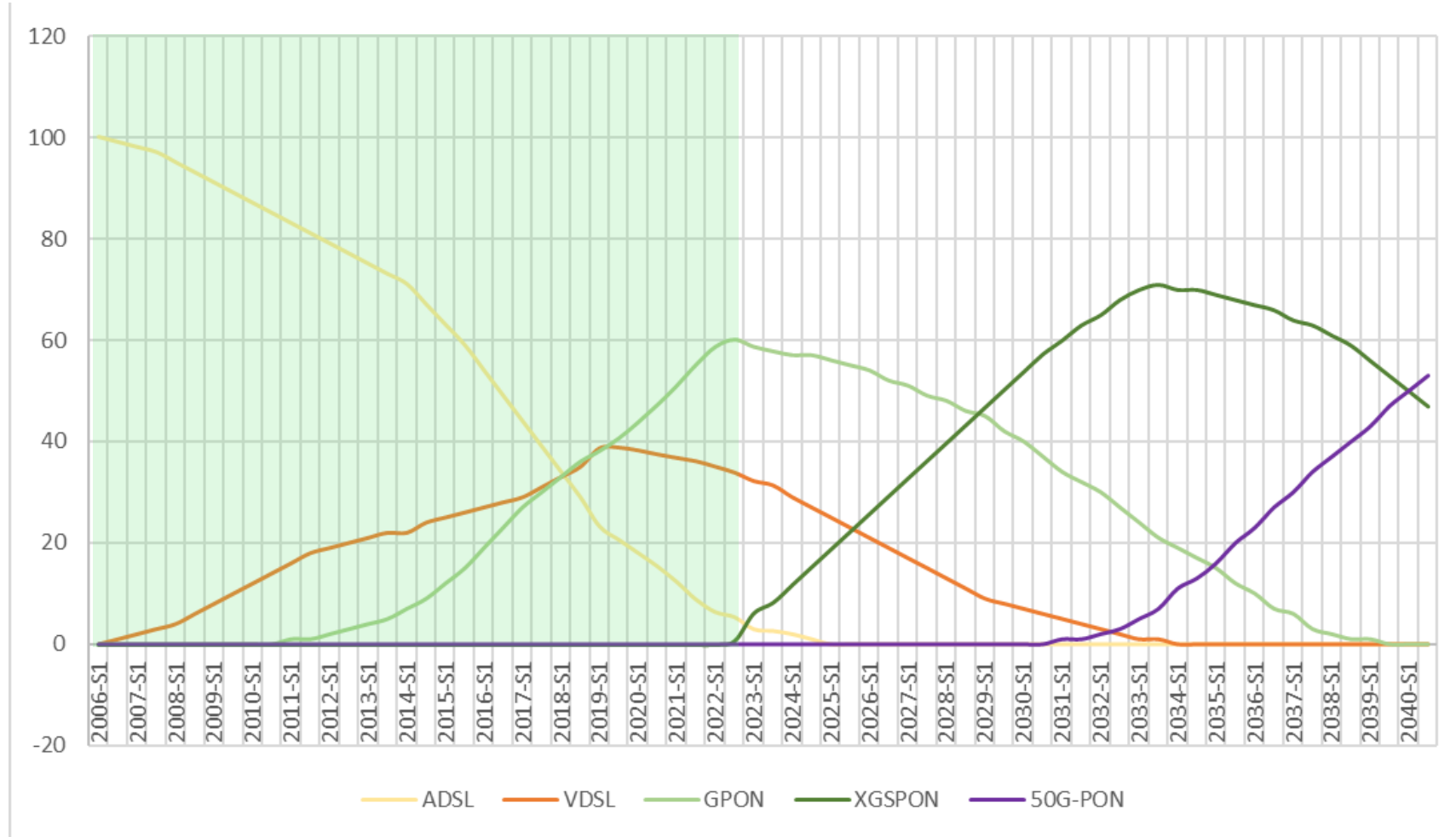
ADSL

VDSL

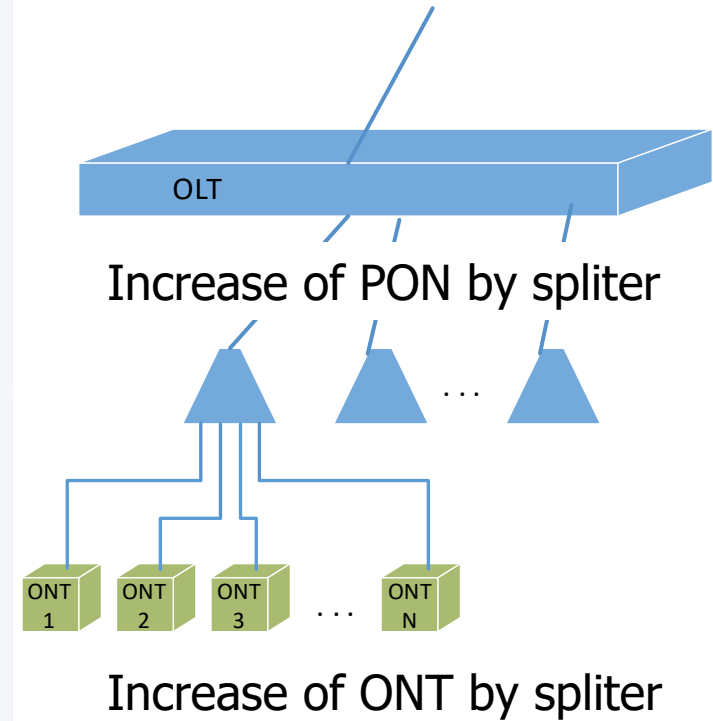
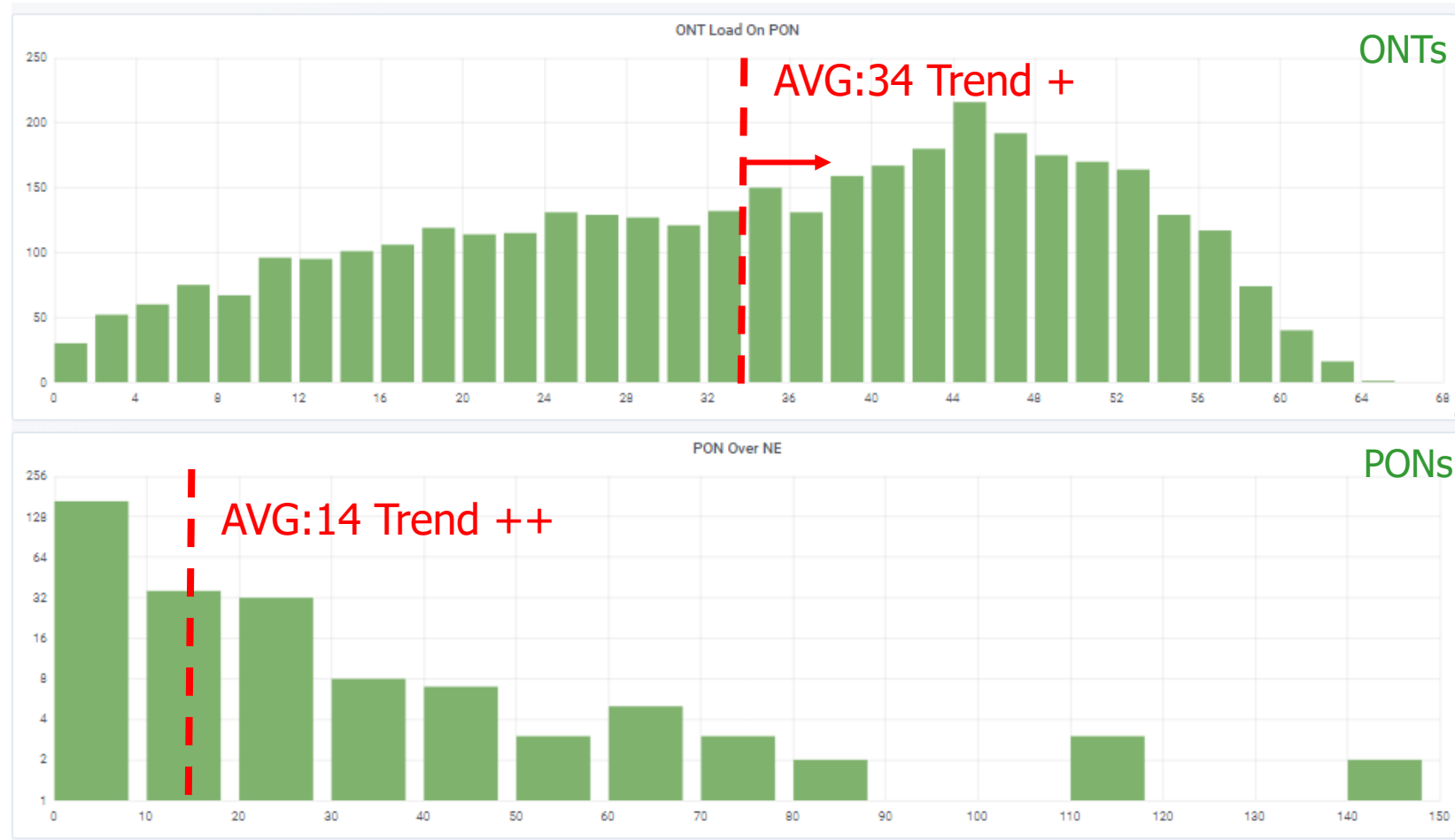
GPON

XGSPON

Forecast for the Next 15 Years



Actual Repartition of OLTs



Street work not ready

Mid density full-fiber

High density area (still copper)

Summary of Requirements on an Uplink OLT

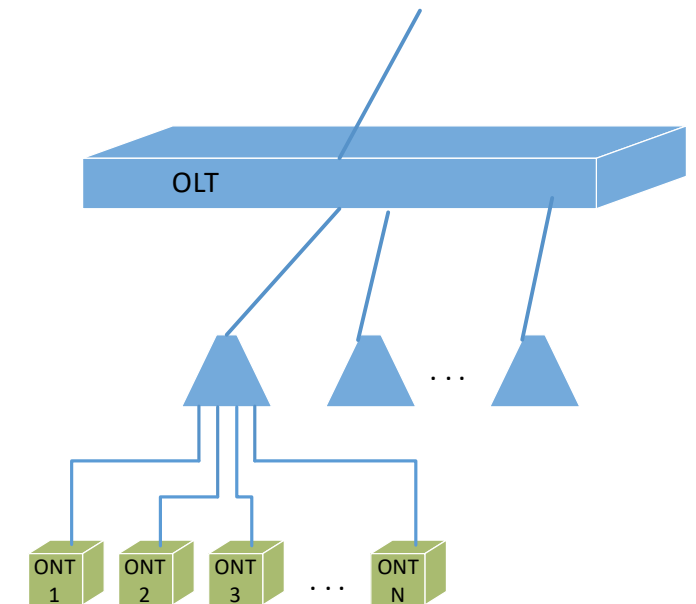
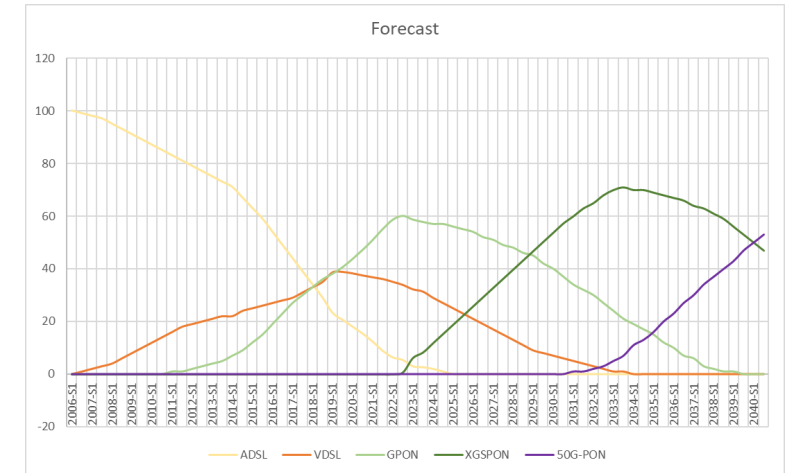
The typical mid-Size OLT will have:

~70 PON

In 2040 half of ONTs will be based on 50G-PON

→ 2 Tb provisionned on the node

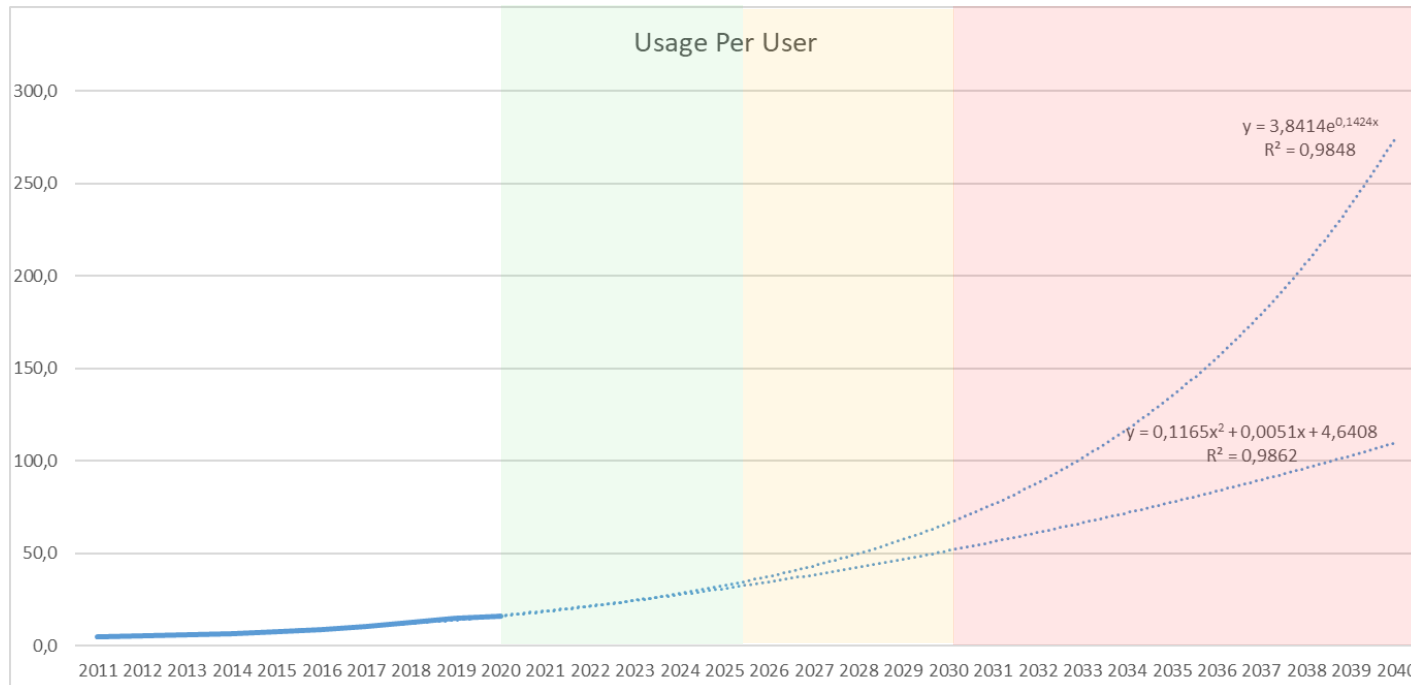
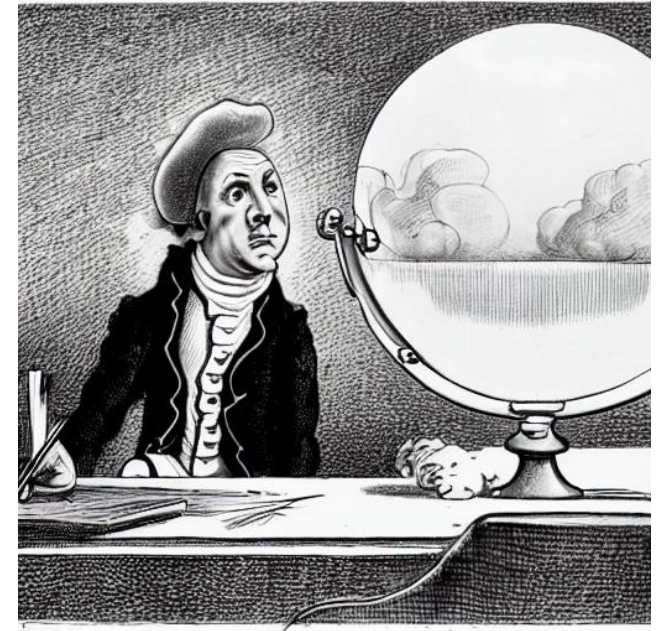
With an overprovisionning factor of 5: 400Gbps/OLT



Expected Usage of the Infrastructure

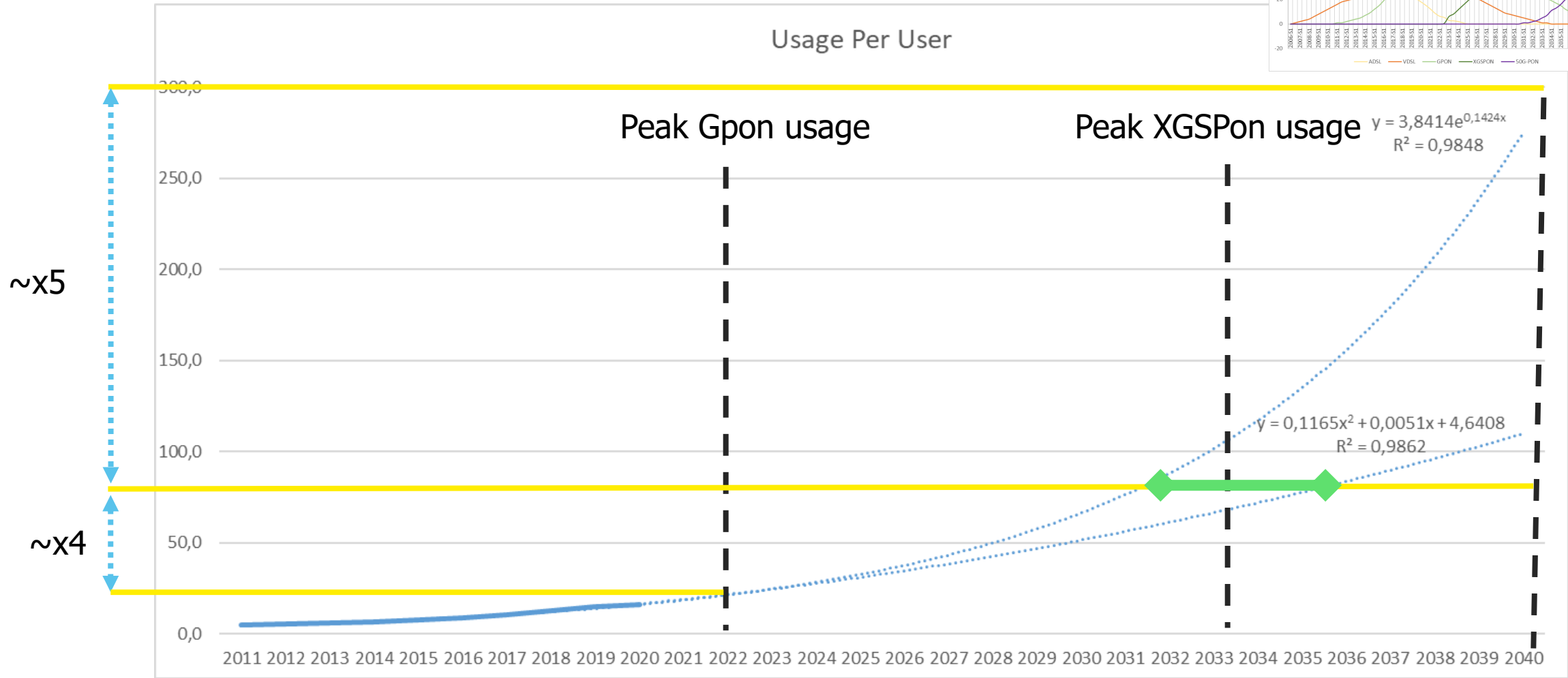
United States' Internet Evolution (Source: Statista)

Difficult to predict more than a few years (not a physical law!)

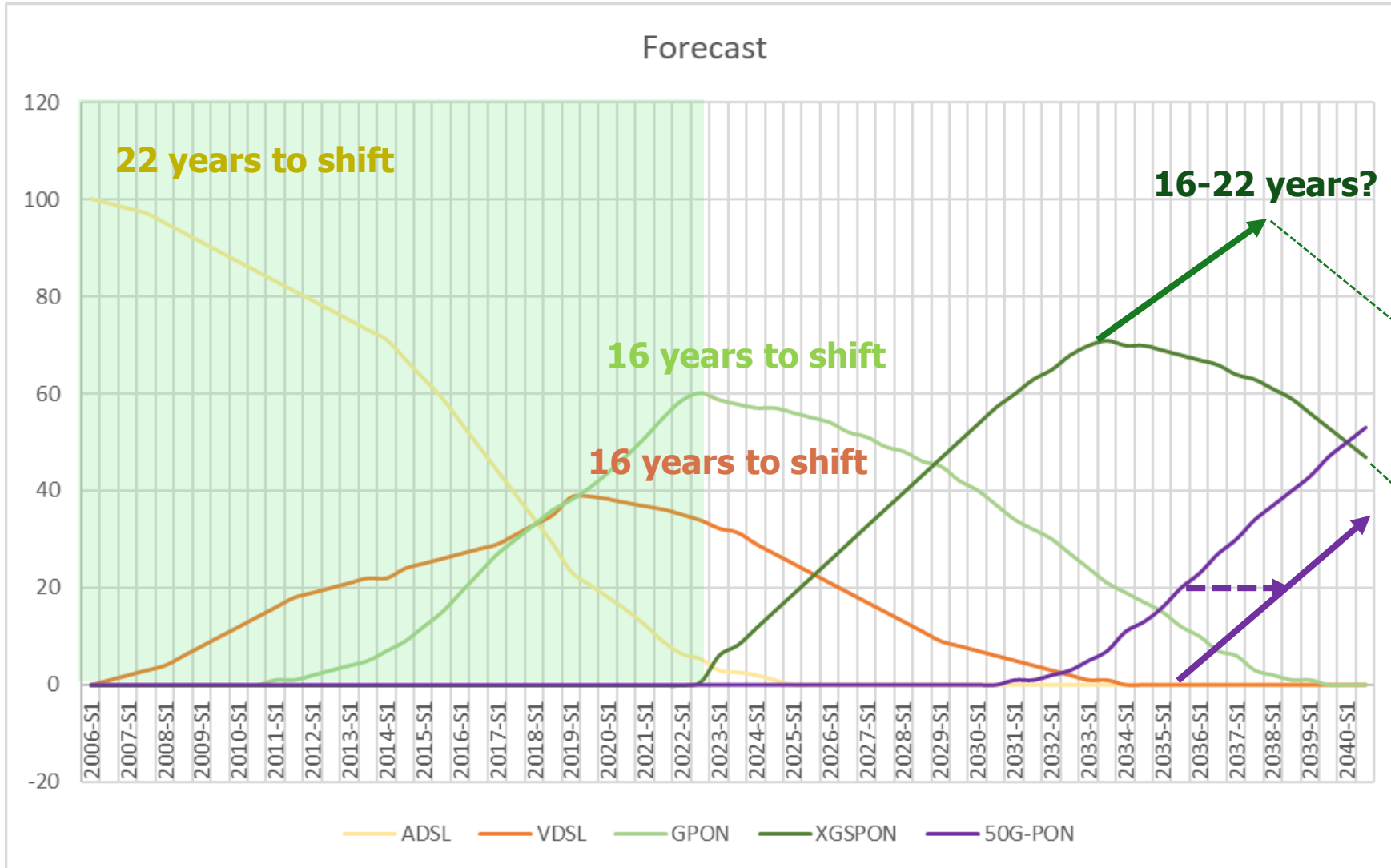


Year	Usage (exabyte/month)	Users(Millions)	Usage/perUser
2011	1,1	245,2	4,5
2012	1,4	255,8	5,5
2013	1,6	266,2	6,0
2014	1,8	279,3	6,4
2015	2,1	286,9	7,3
2016	2,5	292,9	8,5
2017	3	297,7	10,1
2018	3,7	297,8	12,4
2019	4,5	298,2	15,1
2020	4,9	312,3	15,7

«Natural» Evolution of BW Usage



Effect of Shifiting Technologies



How to Use Infrastructure



Best Friend AI vs Human

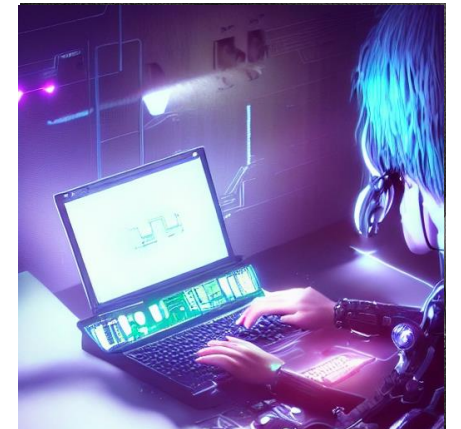
Opinion of Koala & ChatGPT on the services available for full fiber infrastructure:

1. High-speed internet access
2. Video streaming
3. Cloud Computing
4. Virtual and augmented reality
5. Internet of Things
6. Telemedicine
7. Online gaming

Increased usage of residential traffic

New valuable service

- Backhauling for mmWave antenna
- « dedicated network » over slicing technology
- Internet 2.0 => Service-aware network



Usage Evolution: Small Illustrative Exemple



Wife	60 Go	75% mobile
Me	48Go	31% mobile
TV-unicast	15 Go	
Colleague's kids	80Go	80% over mobile

Remind US average forecast : 24Go

Remark:

Perfect wifi with 1gbps offer on WAN

The Green Network

New Critical Concerns

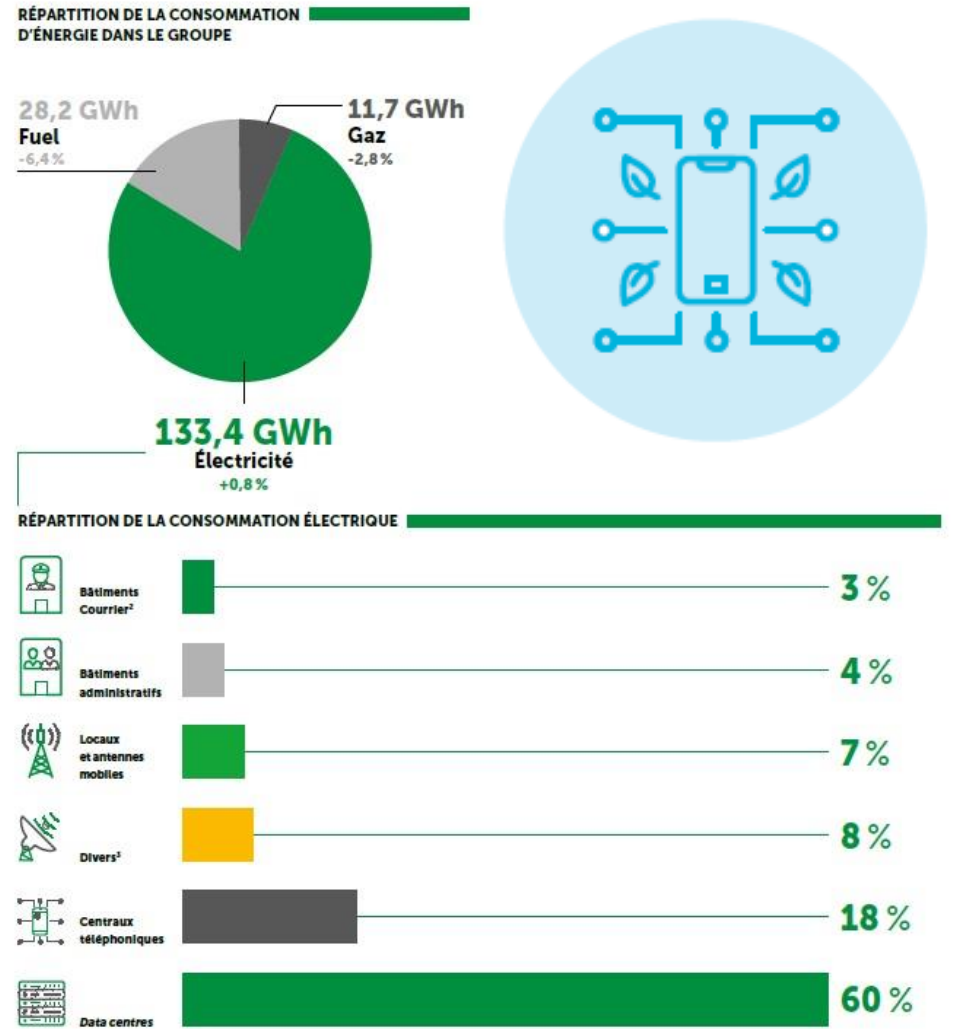
UE's Corporate Sustainability Reporting Directive (CSRD)

Increase of NRJ price

OPEN QUESTION:

How can new tech/deployment be compatible with Green Network?

Extract from the Integrated Group Report



One Network to Rule Them All!

Currently

Multiple network infrastructures (corporate, residential, utility network, ...)

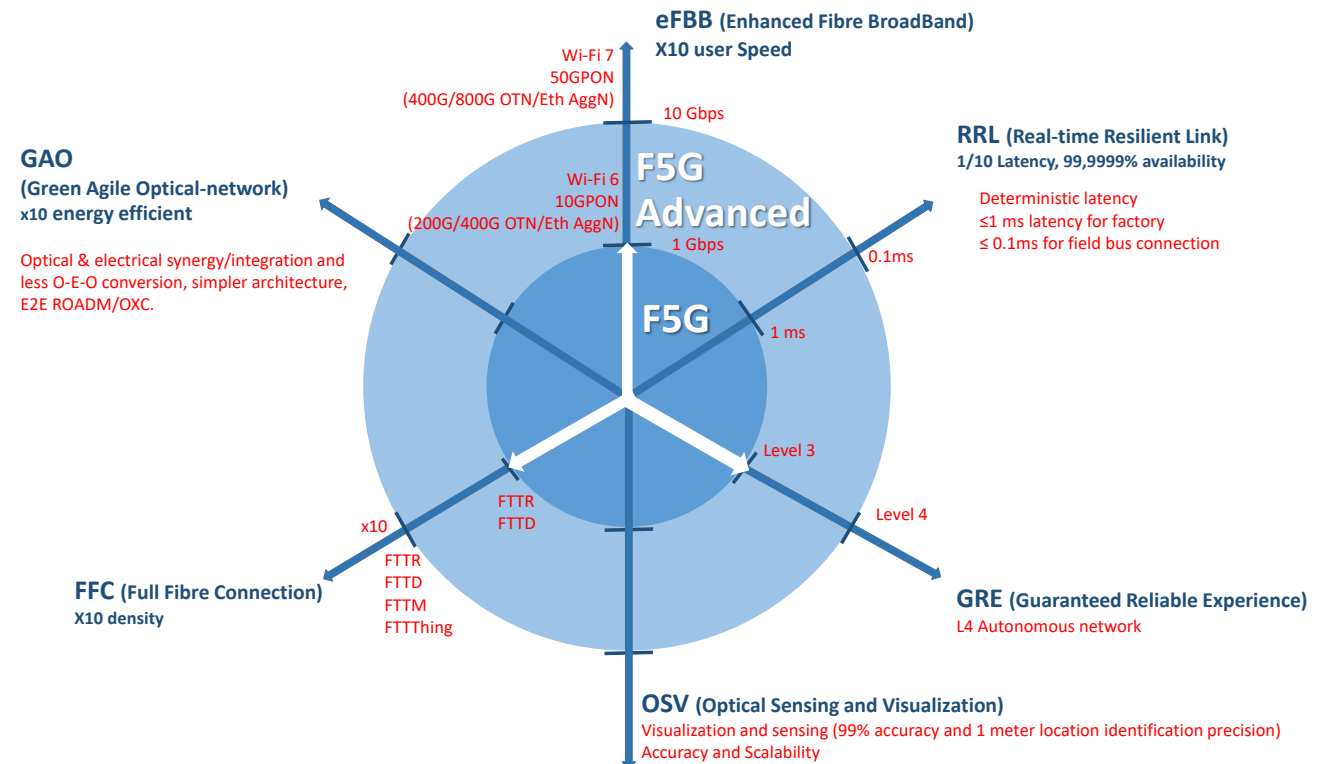
Limited capability for each infrastructure

Little flexibility

In the future

One Network

High capability



Conclusion

The NEED

Bandwidth increase will continue

The CHALLENGE

Create a green network

Create a unified network

Manageable network (high cohesion /low coupling)

The KEY TECHNOLOGIES

50G-Pon

Slicing

Optic network

AI?

Thanks !

