5G & FTTH Network Convergence -Impact on Physical Layer

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Today's Presenters



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Agenda

1) Data Consumption Trends

- 2 Fibre Requirement for 5G Roll-out
- **3** Fibre Requirement for FTTH and P2P
- 4 Converged Fibre Requirements in Distribution Networks
- **5** Implementation Challenges of Converged Fibre

5G

Challenges Solutions

Behaviour Driven View on Data Consumption

You Tube



D

4K

26% IP traffic growth rate (2017-22) 46% Mobile Data traffic growth rate (2017-22) prime NETFLIX 82%

Internet traffic will be in form of video

29%





Source: Cisco Visual Networking Index



FTTH

5G

Convergence

Broadband Data Rates Keep Rising

- Global broadband subscription growth will slow but average broadband speeds will rise sharply:
 - Global average broadband rate to ٠ increase 540% between 2017 and 2024
 - Average broadband rate in 2024 to ulletexceed 270 Mbit/s
- Broadband data rates in some developed regions will be much higher than global averages:
 - Hong Kong to hit 460 Mbit/s by 2024



Source: Ovum, Consumer Broadband Subscription and Revenue Forecast: 2019-24, 2020



5G FTTH

Bandwidth Demand Changing Broadband Access Options Figure 1: North America broadband subscriptions by type, 4Q17–4Q22

- Copper DSL technology quickly becoming obsolete
- Fiber access becoming the first choice for next-gen broadband





Challenges

Convergence

Solutions

5G

COVID Impacts: Near-Term Disruptions





FTTH

Covid Impacts: Longer Term Implications?

Network Effects NETFLIX 55% **Growth in Video streaming** Growth in data consumption post 90% **TIM** lockdown zoom Growth in usage of Video 700% **Conferencing applications** Webex **65%**

veri₇on

Peak increase in VPN traffic during Covid-19

Environmental Effects

Nitrogen Dioxide Levels over Italy

MARCH 2019

5G

MARCH 2020

Challenges



Source: European Space Agency, 2020



5G

Solutions

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Are The Network Operators Future Ready

Bandwidth Drop

- Personally experienced download speed ٠ drops on my fast DOCSIS 3.1 connection
- As much as 75% at specific moments during the day



experience during Lockdown

OTT Platforms had to downgrade streaming quality



Technology

Netflix Reduces Video Quality in More Countries to Handle Surge

Investment In Network Connectivity Is The Need Of The Hour

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5 Implementation Challenges of Converged Fibre

5G - The Holy Grail??

10X

Decrease in latency

Delivering latency as low as

1 ms.

Connection density Enabling more efficient signaling for IoT Connectivity.

Trends

10X

/*****10X

Experienced throughput

Bringing more uniform, multi-Gbps peak rates

Spectrum efficiency

3X

Achieving even more hits per Hz with advanced antenna techniques.



Driving network hyper densification with more small cells everywhere.

100X

品100X

Network efficiency

Optimizing network energy consumption with more efficient processing.

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10X Densification Of Antenna Grid

That Requires Housing/ Mounting Space



5G

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'Real' Implementation Requires Small Cells

5G's Higher Frequencies Penetrate Badly Into Buildings

Small cells will need to be close to human hotspots

Mounted on facades and integrated on public infrastructure like lamp posts, street furniture





To Deliver The Huge Promises, Indoor Offloading Is Mandatory

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Forecasting Small Cells In Europe

3 Operators per site in shared microsites

10X Amount of cell towers to accommodate full 5G services

30% - 60% YoY Growth rate of urban small cells

Small cell requirements for full 5G commitment

5G

Trends



Year	UOM	2019	2020	2021	2022	2023	2024	2025
Urban small cell	(000)pcs	650	1050	1300	1720	1900	2250	2860
EU % (of global)	%	10,0%	12,0%	13,5%	15,0%	16,5%	18,0%	20,0%
EU urban small cell	(000)pcs	65	126	175,5	258	313,5	405	572

Solutions

STU

5G

FTTH Convergence

Solutions

STU

Fibre Requirements For Backhaul Small Cells



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Factors Impacting Fibre Requirement

FTT-5G

Overlaying 5G over FTTH (NG-PON2 for example) is possible but likely only cost competitive when infrastructure work is required – some concerns on latency 99

Point to Point

FTTH in a point-to-point architecture will be limited however it can hugely lift up the fibre count in the distribution part of the network (not included)

Trends



The trend that network infrastructure becomes more often a shared utility is included in the assumptions

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No Significant Impact On The Distribution Part Of The Network

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80%

Convergence Challenges (1/2)

Cost share of civil works in a cable deployment project

Trends

Rest 20% constitutes cables, ducts and supplementary products

5G

FTTH

Convergence

TCO - Cable Deployment Project

5G and FTTH require similar amounts of fibre in the distribution network for a full rollout

Largely, most of FTTH (70%) and 5G small cell (99%) distribution fibres still need to be deployed

Sharing is Caring

Building these networks jointly from technology perspective and service provider perspective will be the only way to make the overall business case work





~5%

Convergence Challenges (2/2)

Extra cable and connectivity cost to accommodate for 5G small cell deployment

Trends

5G

15% additional distribution fibre is a very limited cost for fibre, cable and optical interconnectivity

Challenge at Hand: Add fibre | Avoid additional civil cost

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Smaller optical interconnectivity products like smaller splice closures, drop terminals

Solutions

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Source: ITU-T G.694.2 Literature

5G

FTTH

Solution For 5G And FTTH Convergence







Benefits of New Ribbon Technologies





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Integrated Innovation In Fibre, Optical Fibre Cable And Connectivity Products Allow Us To Implement Additional Fibre Capacity In The Existing Legacy Infrastructure And Help Achieve Converged Networks At Reduced TCO





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