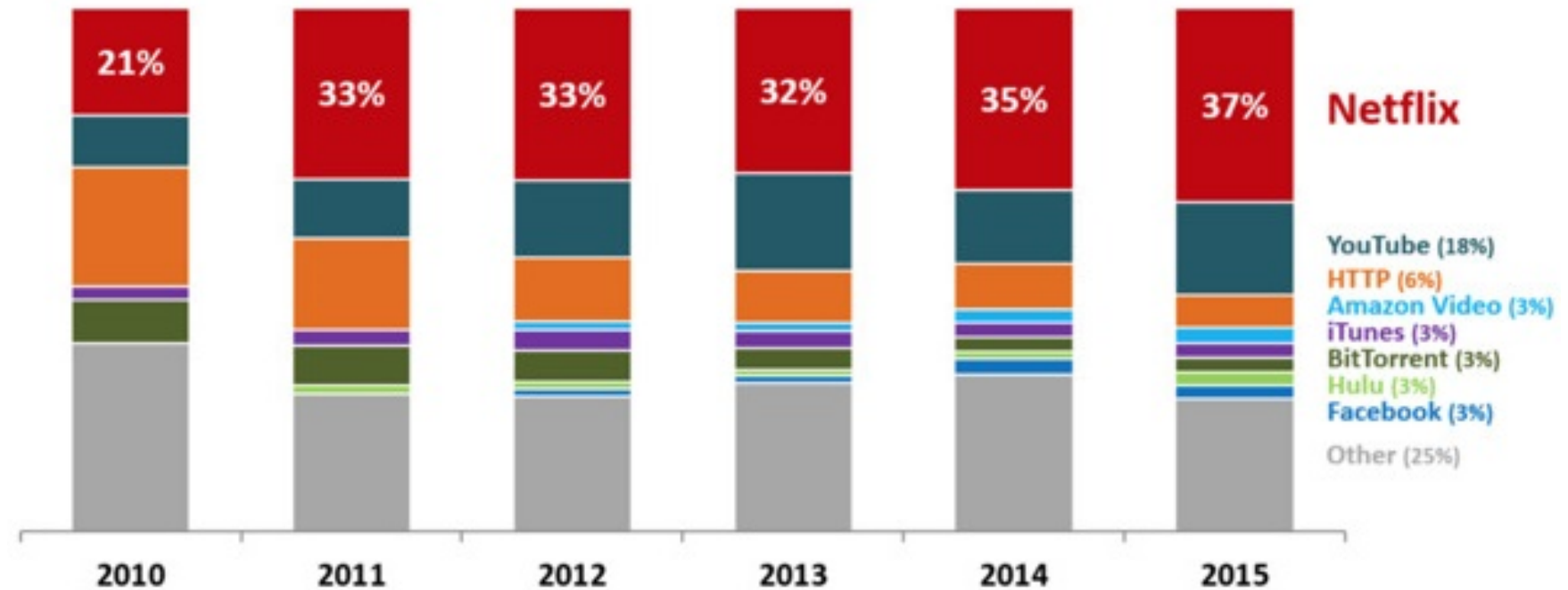# Passive Optical LAN:
Do you really need it?

Talita Ianaguihara Favoreto

Furukawa Electric LatAm

Evolution and Trends

Crescent bandwidth demand

Share of Peak Download Internet Traffic in North America

2010: 21%
2011: 33%
2012: 33%
2013: 32%
2014: 35%
2015: 37%

Netflix
YouTube (18%)
HTTP (6%)
Amazon Video (3%)
iTunes (3%)
BitTorrent (3%)
Hulu (3%)
Facebook (3%)
Other (25%)

Source: Sandvine

Evolution and Trends

Current cabling challenges

- Better use of resources
- Greater security
- Better quality of services
- Greater speed and performance

Storage

Video

Wi-fi Control

VoIP

IoT

Cloud
Centralization and Resources Control

Technological Evolution

Cloud

Mainframe Era

Centralized machines

Time Share

Intelligence-free Terminals

Centralized Control

Energetic Cost

Low Performance

Coaxial Network

PC Era

Personal Computers

Local Processing and Storage

Pulverized Control

PCs with High Processing Capacity

High Energetic Cost

Waste of Resources

Traditional Client-Server Network

Internet (Web)

Access to Information

Control Tools

High Performance Data Centers

Local Access

High Energetic Cost

Waste of Resources

Global Networks

Dialed Access

Social Media

Smartphones / Tablets

Video Streaming

Democratic Information

Shared Resources

High Performance

FTTx Broadband

Passive Optical Networks (POLAN)

New technologies demand, new solutions

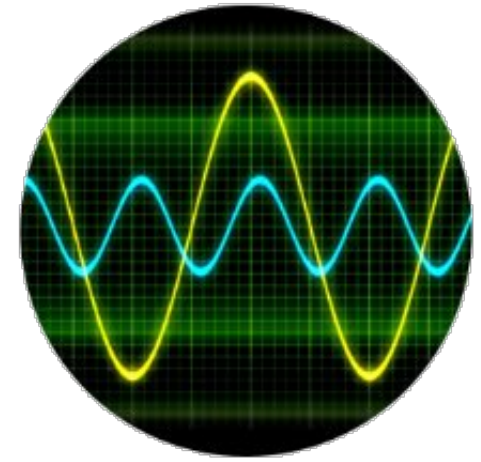# Why Fibre Optics?

Reduced dimensions

Supports long distances

All-Dielectric
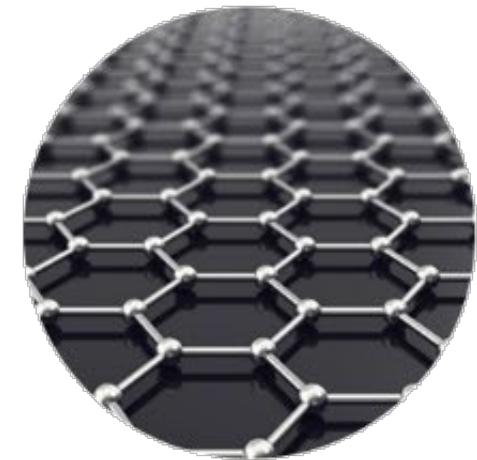
Several services in one fibre

Low attenuation

Secure data traffic

Opticalization:
Datacenters
Access networks
Structured cabling

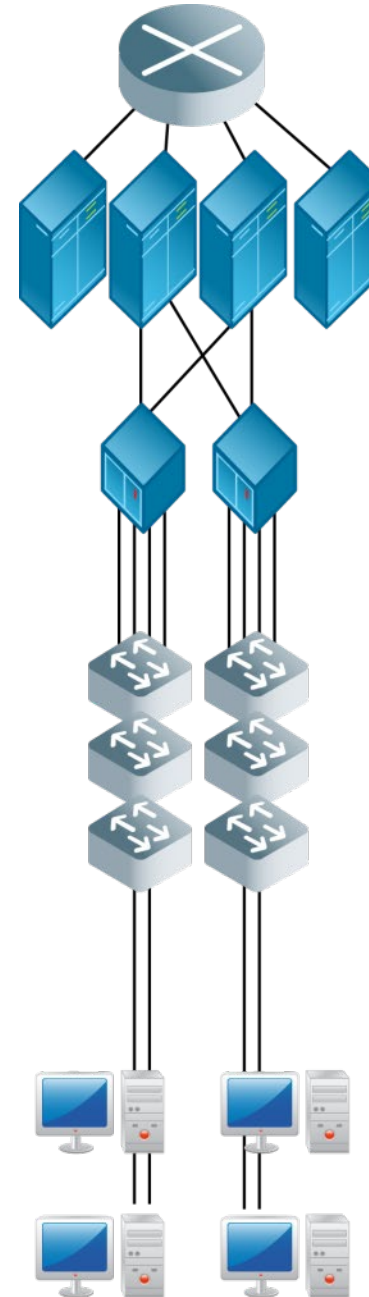Higher bandwidth and transmission capacity
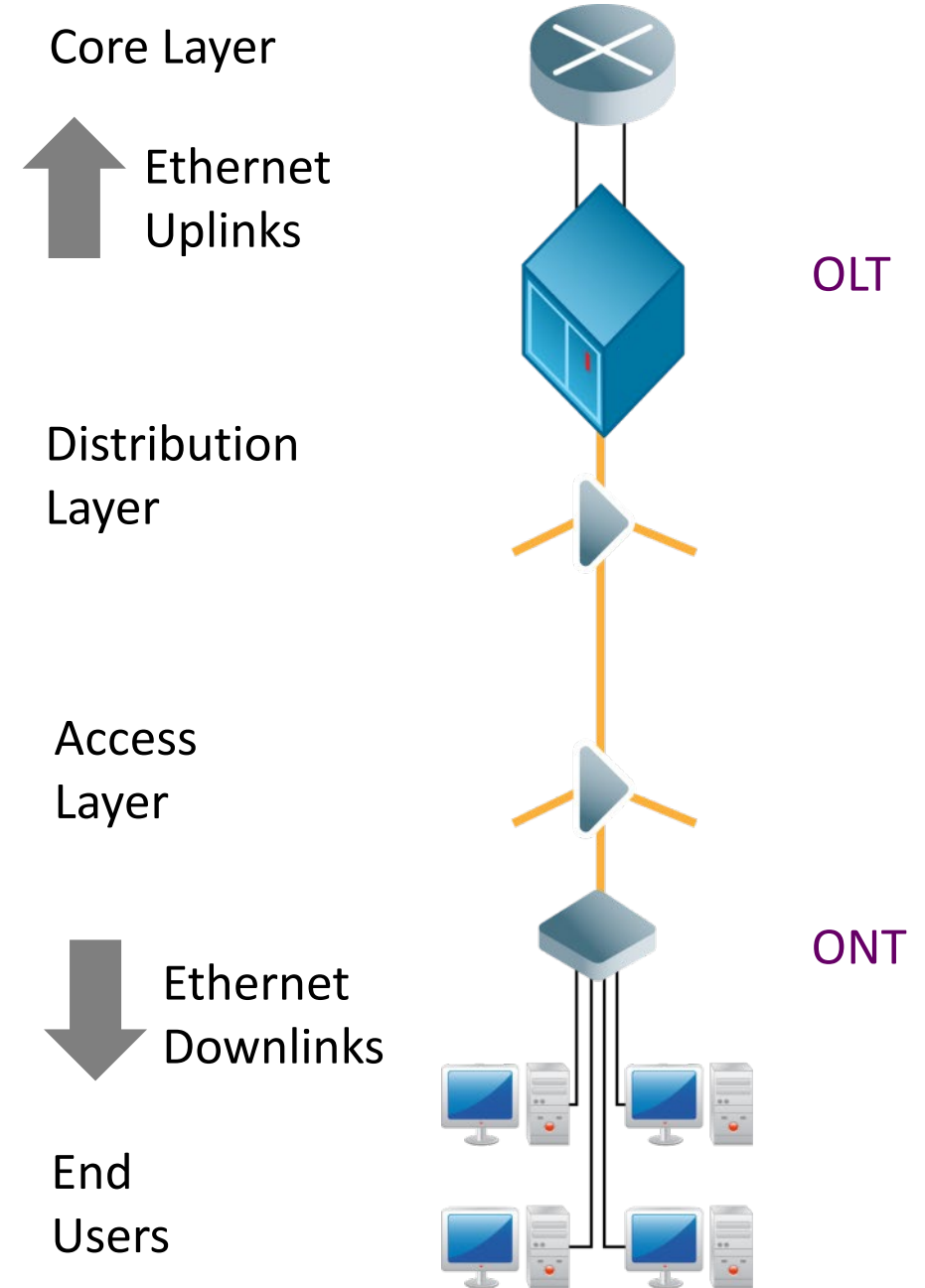
Chemically stable (non-corrosive)

Passive Optical LANs

Concept:

Active Ethernet Switched LAN

Passive Optical LAN Solution

Core Layer

Ethernet Uplinks

Distribution Layer

Access Layer

Ethernet Downlinks

End Users

OLT

ONT

2019 BICSI Middle East & Africa
District Conference & Exhibition

BICSI MIDDLE EAST & AFRICA

Passive Optical LANs

Concept:

OLT

1490 nm TX

1310 nm RX

Splitter   SM Optical Fiber   ONT

1490 nm TX

1310 nm RX

Broadcast

TDMA
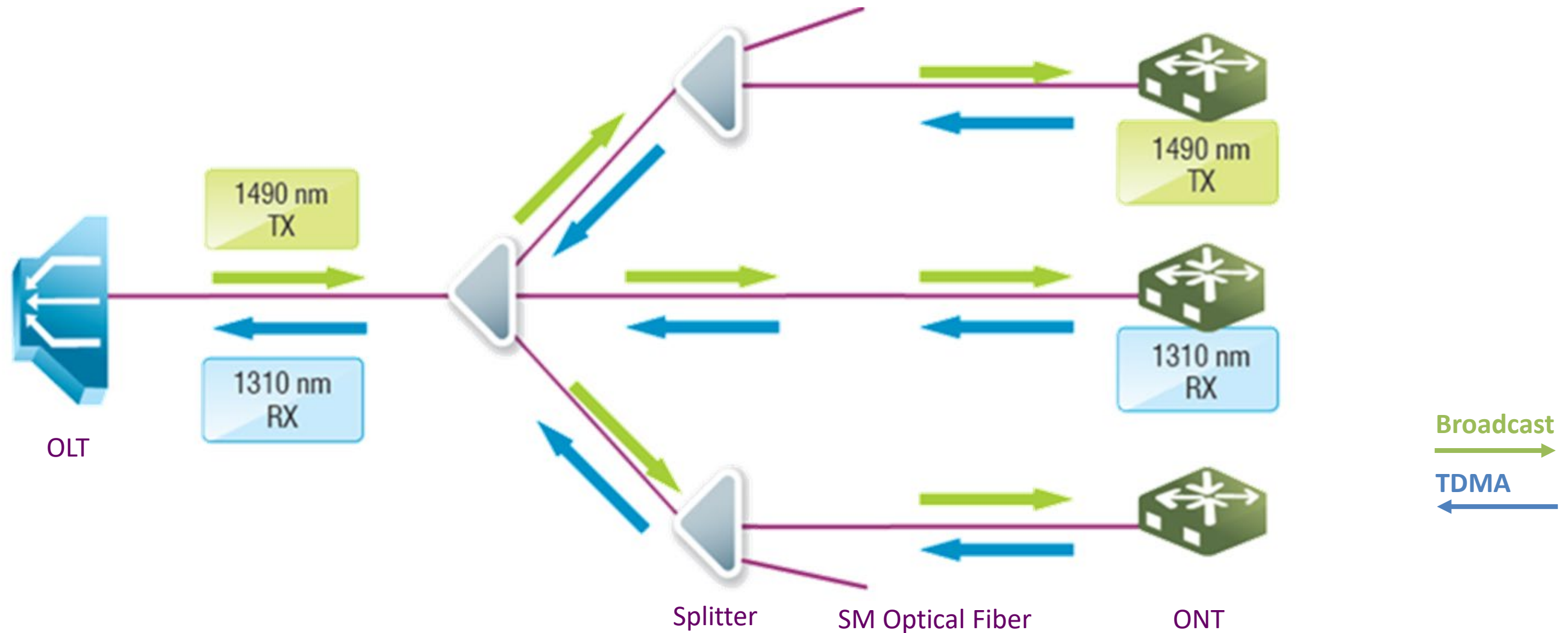
Passive Optical LANs Topology

Pre-terminated Solution

Pre-terminated Trunk Cable MPO/MPO

MUTOA

3.0 mm Single Fiber Patch Cord

OLT

1x32 Splitter

Cassette Patch Panel

MPO/SC-APC Cassette

ONT PoE

ONT

ONT

Equipment Room

Work Area
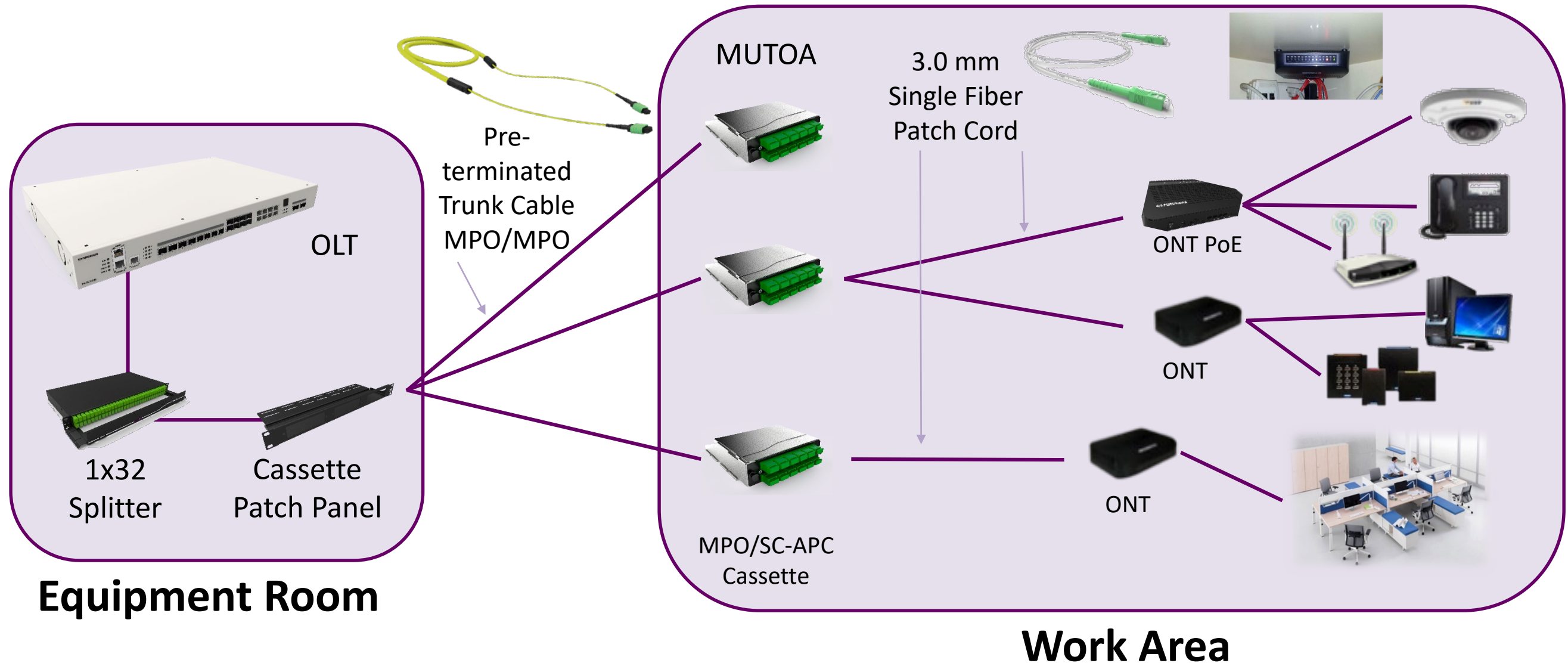
Comparison: Conventional x Passive Optical LAN

Commercial building

Comparison: Conventional x Passive Optical LAN

	Conventional	POLAN
Area 1	**Telecom Room 1:** ODF, SW, SW, PP, PP WA WA WA WA	ONT
Central Area	**Equipment Room:** Dist SW, Core SW, Electric Power, HVAC	**Equipment Room:** SW, OLT, Splitter, Electric Power, HVAC
Area 2	**Telecom Room 2:** ODF, SW, SW, PP, PP WA WA WA WA	ONT

Infrastructure Reduction

Simulation of duct occupation:

Conventional x POLAN:
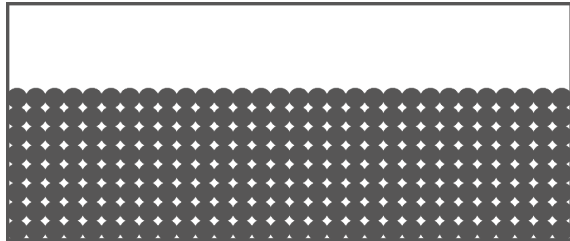
Conventional Network
240 cables Cat.6
Each 100 m = 1,008 kg

POLAN Horizontal Cabling
60 1F cables
94% less occupation
Each 100 m = 60 kg (94% less)

POLAN Distribution Cabling
10 12F cables
96% less occupation
Each 100 m = 36 kg (96% less)

More efficient and sustainable network!

Infrastructure Reduction
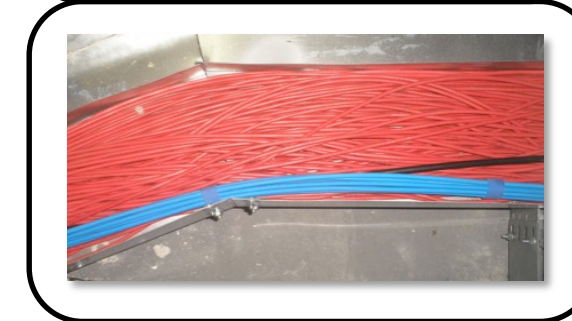
Conventional x POLAN:

✓ Materials cost reduction
✓ Installation and maintenance cost reduction
✓ Installation and maintenance time reduction
✓ No rack maneuverings
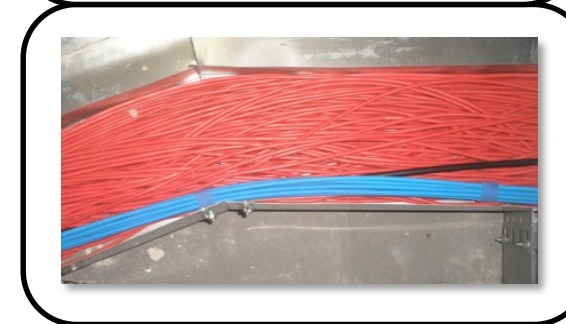
More efficient and sustainable network!

Comparison: active equipment to manage

1024 ports

	Without Redundancy		With Backbone Redundancy	
	Conventional Network	POLAN	Conventional Network	POLAN
Core Equipment	1 switch	1 switch	2 switches	2 switches
Distribution Equipment	2 switches	1 OLTs	4 switches	2 OLTs
Access Equipment	43 switches	256 ONTs	43 switches	256 ONTs
Total configurable equipment	46	2	49	4

Savings with Passive Optical LAN

70%
savings on cables

35%
savings on racks

80%
savings on plastic

70%
savings on space

70%
savings on power

95%
savings on ports

Do you need these Savings?

Standards Reference

POLAN is based on structured cabling technical references aiming to standardize its design and installation

ANSI/TIA-568.0	ANSI/TIA-568.1	ANSI/TIA-568.3
ANSI/TIA-606	ITU-T G.984.1	TDMM 13

1. Entrance Facility
2. Backbone (Primary Cabling)
4. 5. Horizontal Cabling

1. Equipment Room
3. Telecommunication Room/ Cabinet
6. Work Area/ Optical Termination
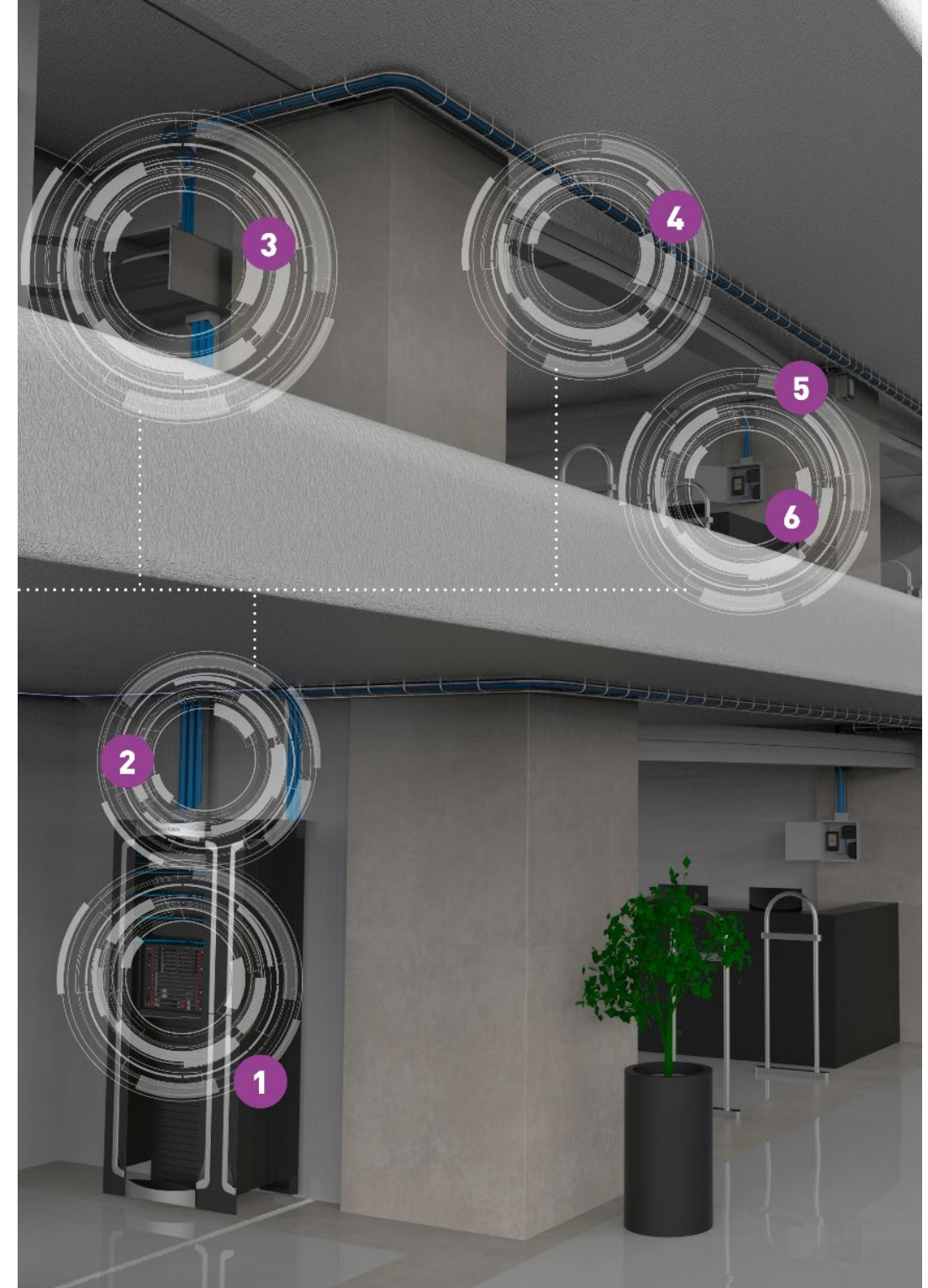
Pre-Terminated Solution Highlights

Installation Time de Installation: no fusions neither connectorizations
Plug and Play: factory-connectorized products
Performance: quick and safe installation
Port utilization: centralized topology, network flexibility

Infrastructure: pathways, technical rooms and cabinets
Vulnerabilities: human failures
Wastes: no connectorizations neither fusions
Complexity: plug and play products

Optimize

Reduce

Pre-Terminated

Savings

Centralize

Energy: less active and cooling equipment
Labor: more agile installation and less investment in training
Space: technical rooms can be reduced or eliminated

Maintenance: maneuvers performed inside the telecommunications enclosure (cabinet)
Management: active equipment inside the telecommunications enclosure (cabinet)
Flexibility: Easy layout change

BICSI MIDDLE EAST & AFRICA

Pre-Terminated Solution Highlights

Installation Time de Installation: no fusions neither connectorizations

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Do you need these Highlights?

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Management: active equipment inside the telecommunications enclosure (cabinet)

Flexibility: Easy layout change

POLAN Advantages

Innovation and Technology
- ✓ All-Optical Structured Cabling System

Green and Efficient Network
- ✓ Reduction of Power Consumption
- ✓ Infrastructure Optimization

Future Proof Technology
- ✓ Optical infrastructure with Tbps capacity

Flexible Infrastructure
- ✓ Easy to handle and expand

Logical and Physical Security
- ✓ Native Standard Cryptography
- ✓ Carrier Standard of Reliability
- ✓ Electromagnetic Immunity

Optimized Operation
- ✓ Centralized Control
- ✓ High Availability

POLAN Advantages

Innovation and Technology

Fully Optical Structured Cabling Network

Green and Efficient Network

Reduction of Power Consumption

Infrastructure Optimization

Future Proof Technology

Optical infrastructure with Tbps capability

Do you need these Advantages?

Flexible Infrastructure

Easy to handle and expand

Logical and Physical Security

Native Standard Cryptography

Carrier Standard of Reliability

Electromagnetic Immunity

Optimized Operation

Centralized Control

High Availability

POLAN Highlights – Capex and OPEX

CAPEX
- Cabling Costs
- Infrastructure Costs
- Installation Time
- Active Equipment Costs
- Energy Requirements
- Facilities Systems Cost (HVAC, UPS, Access Controls, etc)
- Equipment Installation and Activation Service Costs

OPEX
- Energy Costs
- Real Estate Rental Costs
- Service Agreements Time and Costs
- Incident Management Time and Costs
- Training Costs
- Physical and Logical Security Risks and Costs
- Change Management Time and Costs
- Network Patches and Upgrades Costs
- Capacity Management Time and Costs

POLAN Highlights – Capex and OPEX

CAPEX

- Cabling Costs
- Infrastructure Costs
- Installation Time
- Energy Requirements
- Facilities Systems Cost (HVAC, UPS, Access Controls, etc)
- Equipment Installation and Activation Service Costs

Total Cost of Ownership (TCO) Savings

OPEX

- Real Estate Rental Costs
- Service Agreements Time and Costs
- Incident Management Time and Costs
- Physical and Logical Security Risks and Costs
- Change Management Time and Costs
- Network Patches and Upgrades Costs
- Capacity Management Time and Costs

Market Verticals

POLAN adds value to several kinds of business

Enterprises   Industries
Call Centers   Logistics
Airports   Universities
Hotels   Public Facilities
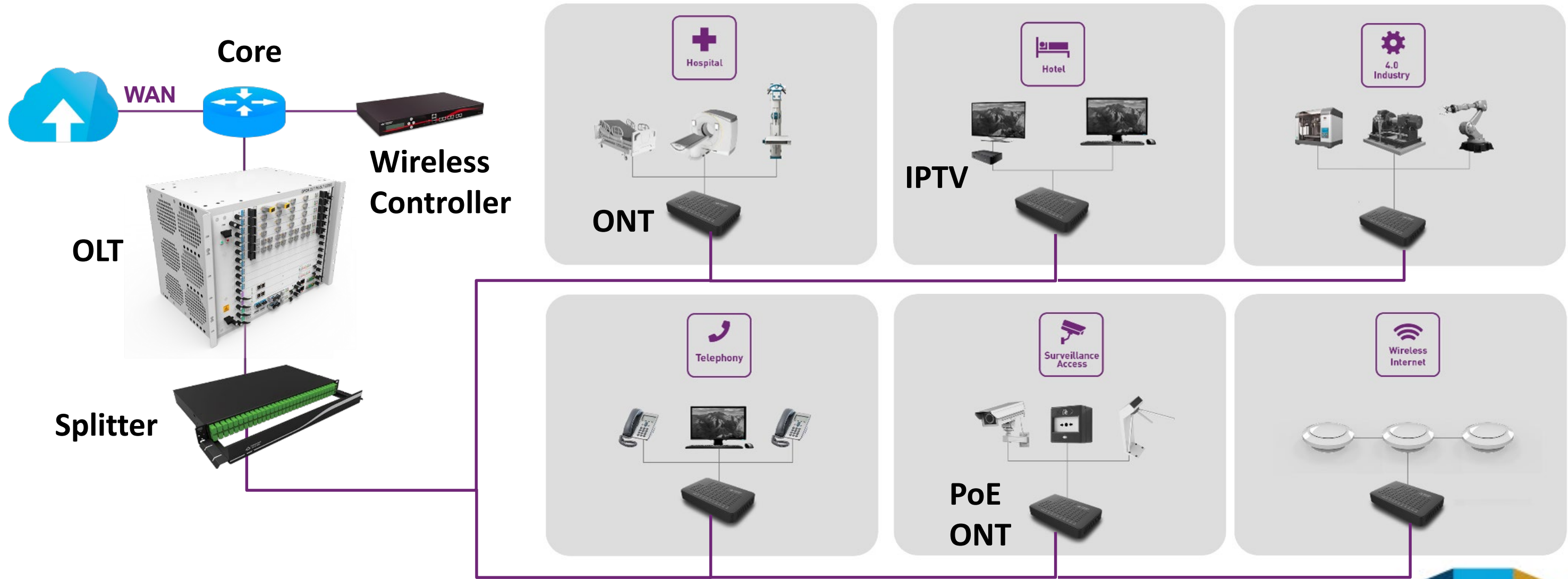
POLAN: Enterprise

- ✓ Savings in TCO (CAPEX, OPEX, Energy)
- ✓ Easier to Manage, Maintain and Change
- ✓ Longer Life for Cabling
- ✓ Less Physical Space Usage: Lower Real Estate Costs
- ✓ Convergent Network: Data, Voice, Video, WiFi, CCTV, BMS
- ✓ Higher Equipment Reliability and Less Physical Risk
- ✓ Reduction on Environmental Impact (Energy and Life Cycle)

POLAN: Healthcare

- ✓ Higher Equipment Reliability and Less Physical Risk
- ✓ Less Physical Space Usage: more space available to healthcare activities
- ✓ Convergent Network: Data, Voice, Video, WiFi, Automation, PACS, PIMS, CCTV, BMS
- ✓ Savings in TCO (CAPEX, OPEX, Energy)
- ✓ Easier to Manage, Maintain and Change
- ✓ Immune to EMI and doesn't generate EMI
- ✓ Reduction on Environmental Impact (Energy and Life Cycle)

POLAN: Hotel and Convention Centres

- ✓ Convergent Solution: Voice, Data, WiFi, IPTV, CCTV, BMS
- ✓ Support to Large Areas
- ✓ WiFi Service Quality
- ✓ Less Physical Space Usage: more space available for rooms
- ✓ Savings in TCO (CAPEX, OPEX, Energy)
- ✓ Easier to Manage, Maintain and Change
- ✓ Reduction on Environmental Impact (Energy and Life Cycle)
- ✓ Higher Equipment Reliability and Less Physical Risk

POLAN: Call Centres

✓ Convergent Solution: Data, Voice (Support to IP and Analog Phones)

✓ Support to Large Areas

✓ Less Physical Space Usage: More space available to Operators positions

✓ Savings in TCO (CAPEX, OPEX, Energy)

✓ Easier to Manage, Maintain and Change

✓ Reduction on Environmental Impact (Energy and Life Cycle)
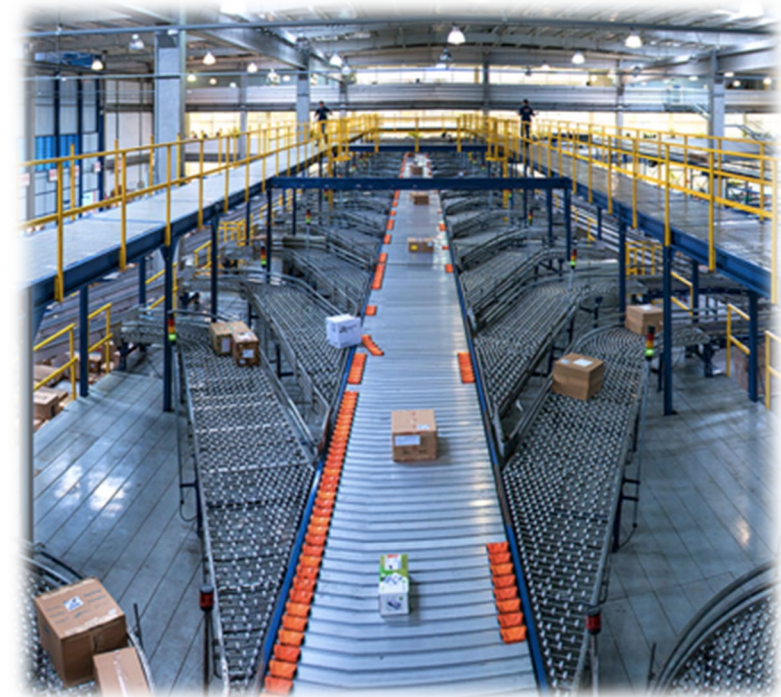
✓ Higher Equipment Reliability and Less Physical Risk
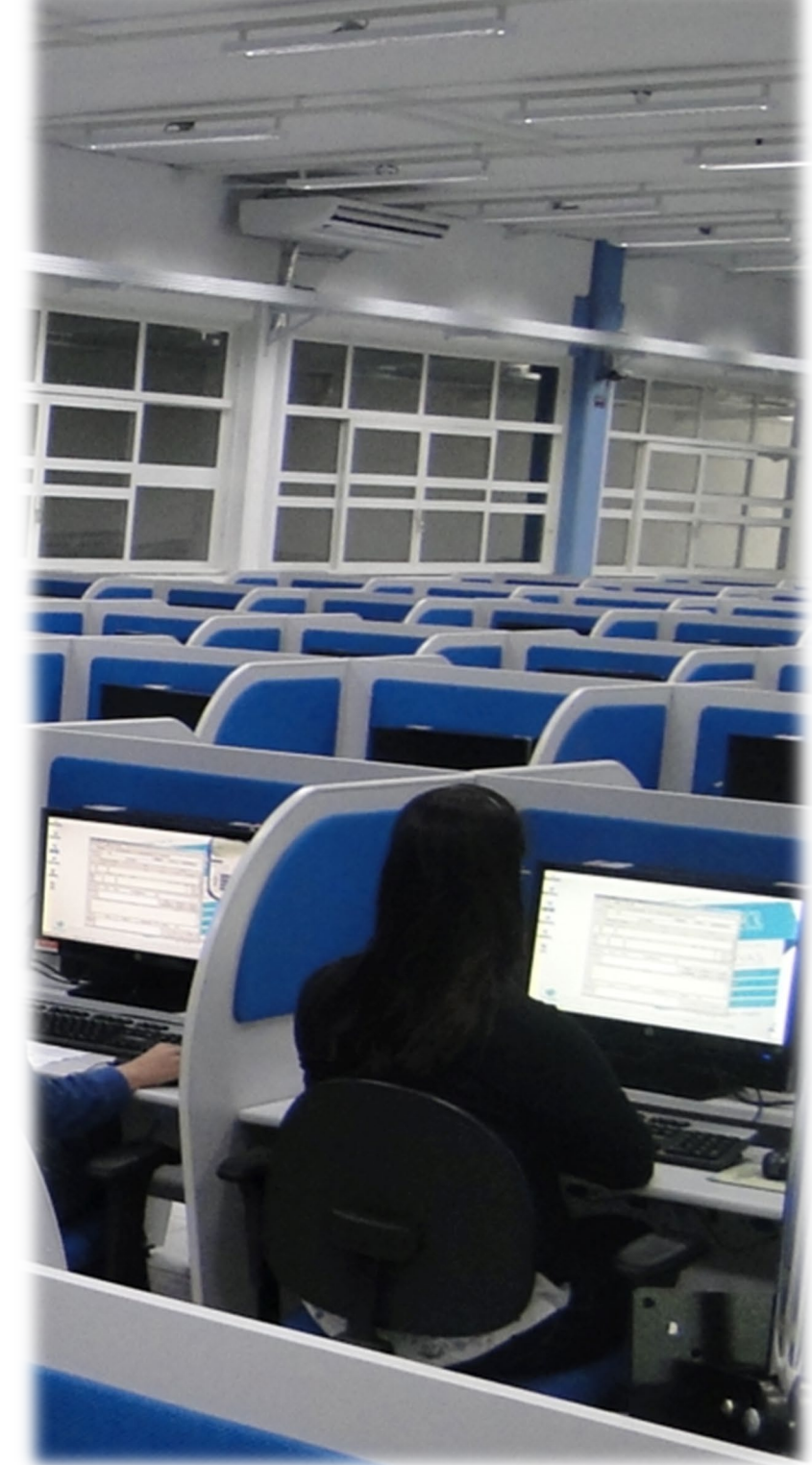
# POLAN: Shipping, Logistics & Airports

✓ Higher Equipment Reliability and Less Physical Risk

✓ Support to Large Areas

✓ Less Physical Space Usage: more space available to primary functions

✓ Savings in TCO (CAPEX, OPEX, Energy)

✓ Convergent Solution: Data, Voice, Video, Automation, Industrial, CCTV

✓ Easier to Manage, Maintain and Change

✓ Reduction on Environmental Impact (Energy and Life Cycle)

POLAN: Industry / IoT

- ✓ Industry 4.0
- ✓ Internet Of Things
- ✓ Higher Equipment Reliability and Less Physical Risk
- ✓ Support to Large Areas
- ✓ Easier to Manage, Maintain and Change
- ✓ Savings in TCO (CAPEX, OPEX, Energy)
- ✓ Convergent Solution: Industrial Protocol Compatibility
- ✓ Reduction on Environmental Impact (Energy and Life Cycle)
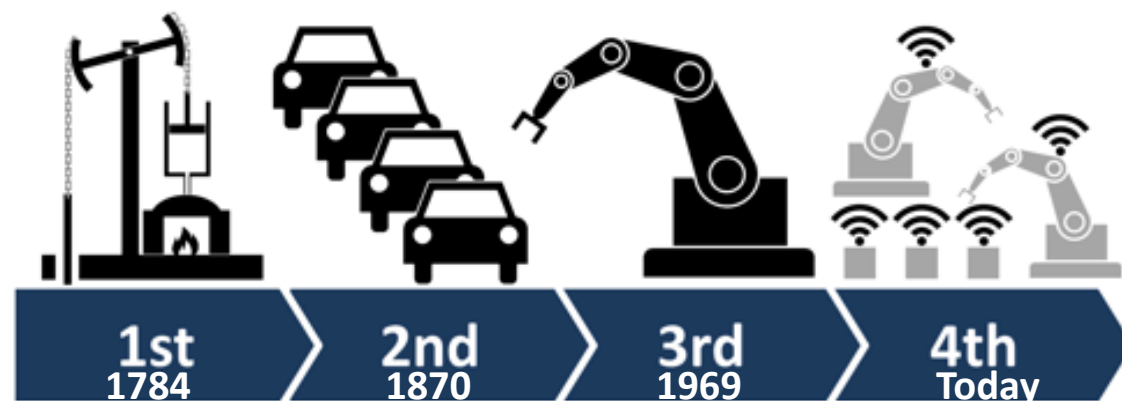
Hospitality Sector

Why consider providing fi

Global Demand

Europe

Americas

Asia

MEA

Asia

Global Rank	Country/Region	% Above 15 Mbps	QoQ Change	YoY Change
1	South Korea	69%	7.8%	-0.4%
4	Hong Kong	54%	2.8%	13%
5	Japan	52%	3.3%	20%
6	Singapore	51%	-1.4%	20%
13	Thailand	43%	56%	186%
19	Taiwan	38%	16%	17%
27	New Zealand	32%	26%	111%
47	Australia	19%	21%	90%
52	Malaysia	14%	28%	339%
57	Vietnam	11%	69%	1,222%
58	India	10%	38%	405%
63	Philippines	6.2%	72%	509%
69	Indonesia	5.0%	16%	520%
70	China	5.0%	122%	1,146%
–	Sri Lanka	11%	101%	556%

Figure 27: 15 Mbps Broadband Adoption (IPv4) by APAC Country/Region

Europe

Global Rank	Country/Region	% Above 15 Mbps	QoQ Change	YoY Change
2	Switzerland	56%	3.9%	26%
3	Norway	54%	0.1%	8.1%
7	Sweden	49%	0.6%	7.1%
9	Romania	47%	5.6%	14%
10	Denmark	46%	-4.5%	14%
11	Netherlands	46%	-0.4%	8.4%
12	Finland	45%	1.6%	21%
14	United Kingdom	42%	5.4%	16%
15	Belgium	41%	1.4%	6.8%
17	Ireland	39%	2.1%	29%
18	Latvia	38%	-6.7%	-10%
20	Bulgaria	38%	-3.0%	-5.2%
22	Spain	36%	1.2%	29%
23	Czech Republic	36%	-0.2%	0.9%
24	Hungary	34%	6.2%	14%
25	Germany	33%	10%	27%
28	Lithuania	32%	-0.9%	-4.3%
31	Portugal	29%	2.4%	-5.6%
35	Austria	26%	2.8%	19%
36	Malta	25%	-4.6%	-2.3%
37	Poland	25%	0.1%	3.5%
39	Slovenia	24%	-2.9%	0.6%
40	Slovakia	23%	2.2%	4.3%
42	Russia	21%	1.3%	-9.1%
43	Estonia	21%	3.6%	-2.2%
44	Luxembourg	20%	14%	43%
49	France	18%	14%	33%
55	Italy	12%	17%	73%
59	Croatia	8.3%	14%	76%
64	Greece	6.2%	22%	43%
–	Cyprus	5.8%	-4.4%	62%

Figure 32: 15 Mbps Broadband Adoption (IPv4) by European Country

Americas

Global Rank	Country/Region	% Above 15 Mbps	QoQ Change	YoY Change
8	United States	48%	14%	36%
16	Canada	40%	16%	25%
50	Chile	15%	18%	243%
54	Uruguay	13%	55%	206%
65	Mexico	6.1%	15%	52%
66	Brazil	5.8%	16%	451%
68	Arger			
72	Peru			
73	Ecuad			
75	Color			
–	Panar			
–	Costa			
–	Bolivi			
–	Vene			
–	Parag			

Figure 22: 15 Mb

MEA

Global Rank	Country/Region	% Above 15 Mbps	QoQ Change	YoY Change
26	Qatar	33%	36%	242%
29	Kenya	31%	-30%	247%
32	Israel	28%	-7.6%	16%
60	Turkey	7.5%	5.9%	77%
62	United Arab Emirates	6.3%	-61%	11%
67	South Africa	5.8%	-6.1%	-25%
71	Saudi Arabia	4.7%	21%	836%
76	Morocco	1.4%	0.1%	511%
–	Kuwait	8.9%	-1.0%	67%
–	Nigeria	0.9%	-5.5%	83%
–	Namibia	0.3%	-31%	231%
–	Egypt	0.3%	243%	-61%
–	Iran	0.1%	15%	35%

Figure 37: 15 Mbps Broadband Adoption (IPv4) by MEA Country

Hospitality Sector

Why consider providing fiber to the customer?

Trip Advisor Index

tripadvisor | Insights

Get Started ∨   Build Your Business ∨   Mar

- 1 in 5 travelers (21%) have chosen a destination because a hotel had a special offer or package.

- "TV tourism" is on the rise: 1 in 5 global travelers have visited a destination because they saw it on a TV show.

Trend #4 – Staying cool and connected

Among the amenities that travelers will look for when they book an accommodation in 2016, air conditioning and WiFi stand out.

- Globally, 63% of travelers said air conditioning is a must-have when choosing a place to stay. That makes it more of a deal-breaker than breakfast (40%) or a swimming pool (26%).

- 46% said free in-room WiFi is a must-have amenity—meaning that, if an accommodation did not provide it, they would look elsewhere.

- 26% of travelers said that they require an accommodation that has super-fast WiFi; 11% are willing to pay extra for this service.

Hospitality Sector

Improve the digital experience to attract and to retain customers
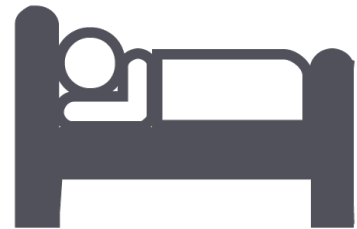
Fiber To The Room

- ✓ HDTV / IPTV
- ✓ Video Conference
- ✓ Check-out in the room
- ✓ Broadband Internet
- ✓ Video Streaming
- ✓ Temperature Control
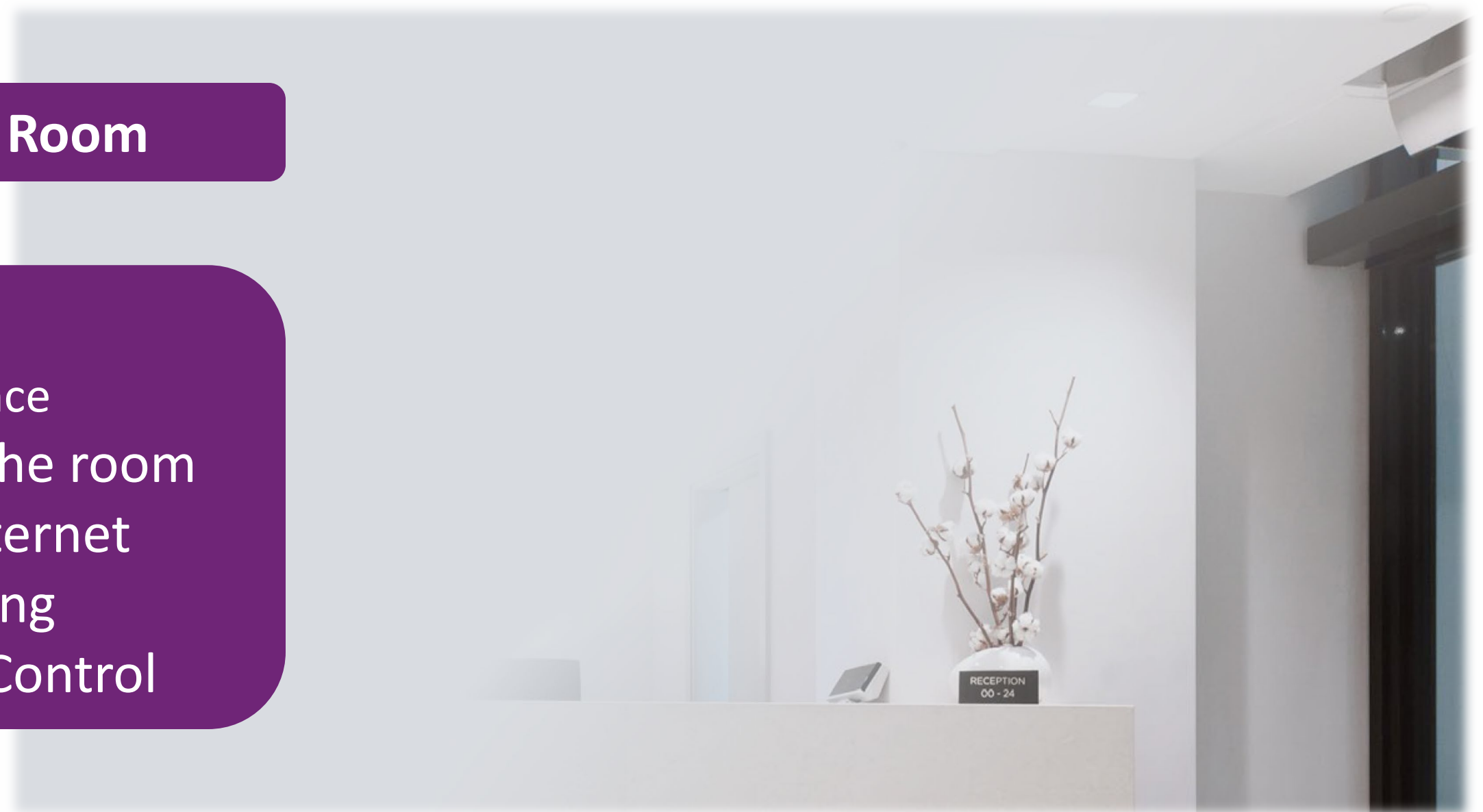
Hospitality Sector - Success Case

Olímpia Park Resort

900 guest rooms in 4 buildings
3 OLTs
250 ONTs

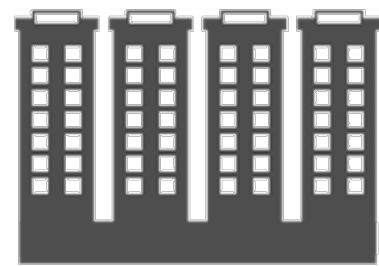**Supported Services**

Ready for

VoIP   **IPTV**

Hospitality Sector - Potential Extra Revenue

Benefits for the business and for the guests
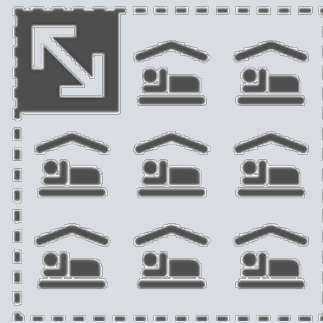
4 towers Resort

900 rooms

w/ POLAN

Technical rooms 400m^2 smaller

400m^2 = 8 50m^2 rooms

+8 rooms x USD 500 per day x 1 year = **USD 306k** extra revenue

+8 rooms x USD 500 per day x 2 years = **USD 613k** extra revenue

+8 rooms x USD 500 per day x 3 years = **USD 919k** extra revenue

+8 rooms x USD 500 per day x 4 years = **USD 1.2M** extra revenue

+8 rooms x USD 500 per day x 5 years = **USD 1.5M** extra revenue

(with 70% occupancy rate)

Passive Optical LAN:
Do you really need it?

Sure you do!

Thank you!

Talita Ianaguihara Favoreto

Furukawa Electric LatAm

BICSI
MIDDLE EAST
& AFRICA