

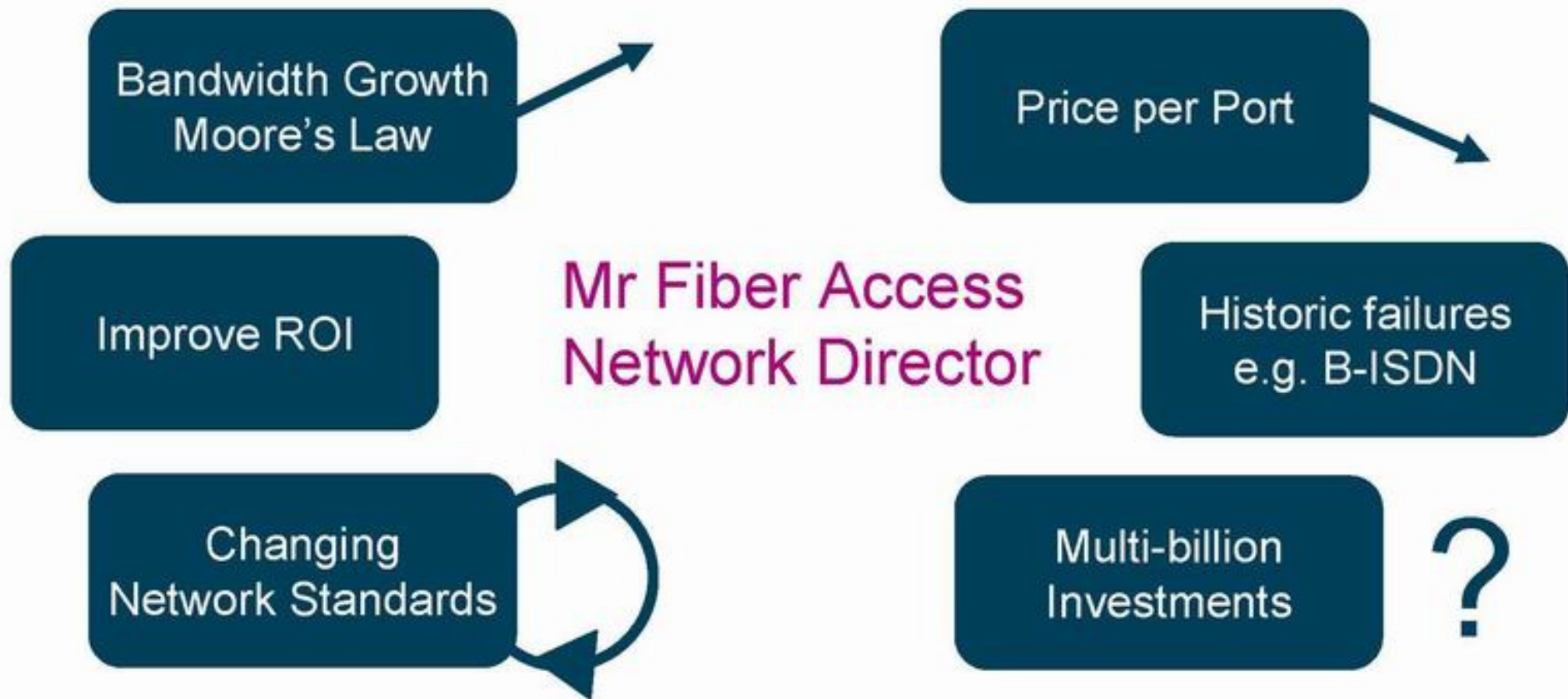
The New Fiber Access:
Unified &
Programmable



FTTH China 2009, Shenzhen 8-9 September 2009

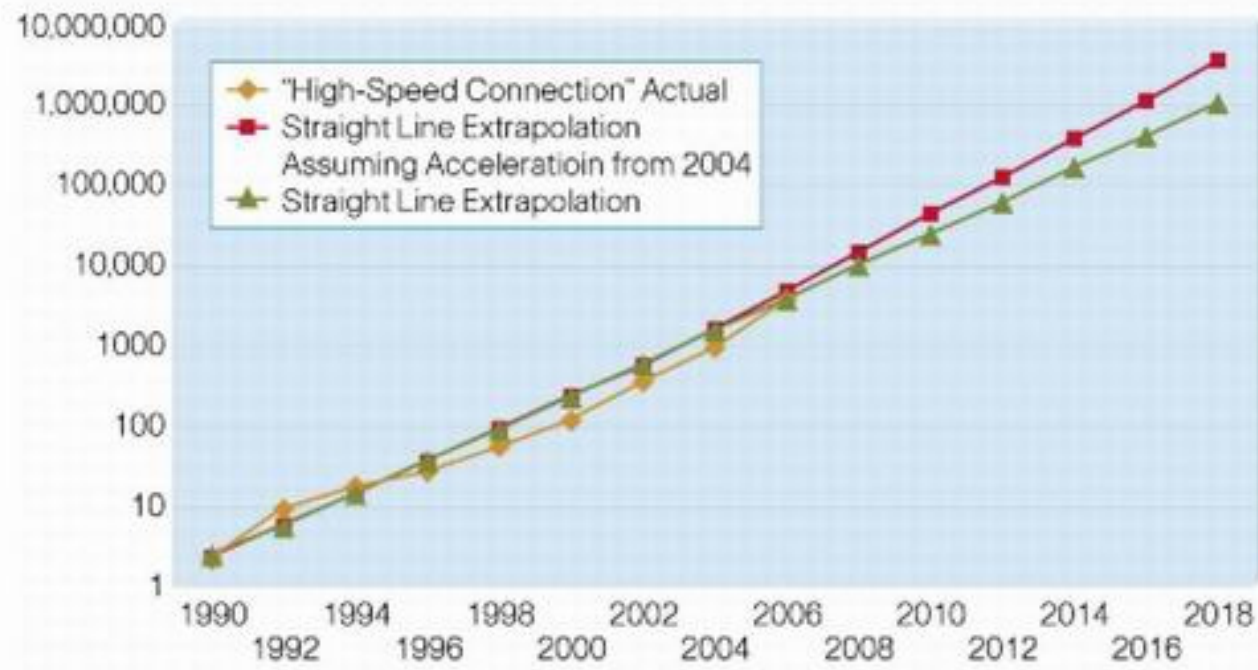
By Thomas Eklund,
Founder, VP Marketing and Business Development

The World's Toughest Job



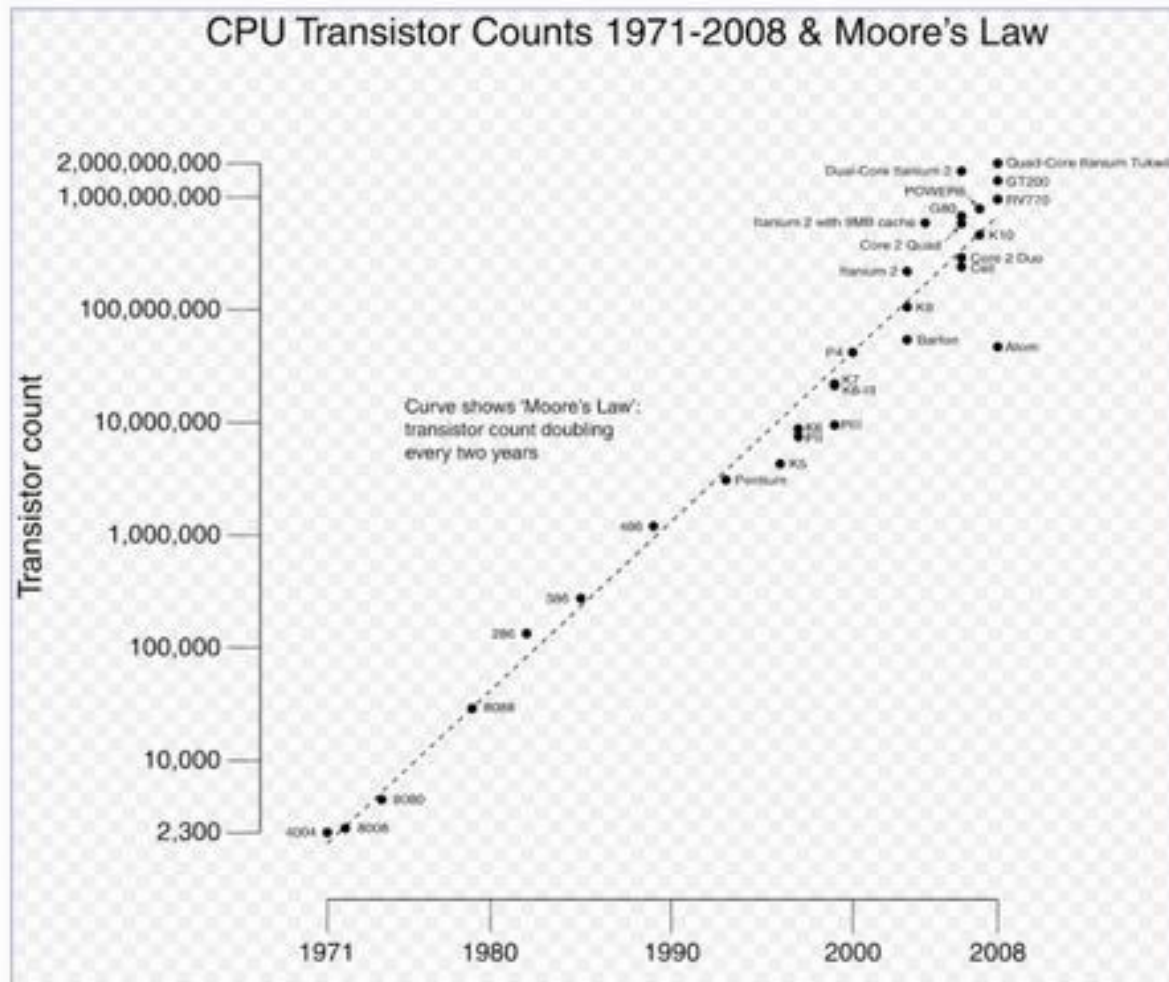
FTTH designs foundation for networking industry for years to come

The Bandwidth Explosion is **Real**



Source: Lightreading

Luckily, Chip Industry is on Par



(Credits to Wikipedia)

- Carrier Ethernet Centric
- Optimized L2-L4 Packet Processing
- Merchant processing used by all top 8 system vendors

All-IP is Really **All-Ethernet**

Flexible Carrier Ethernet enables Unified FTTx



Network Convergence



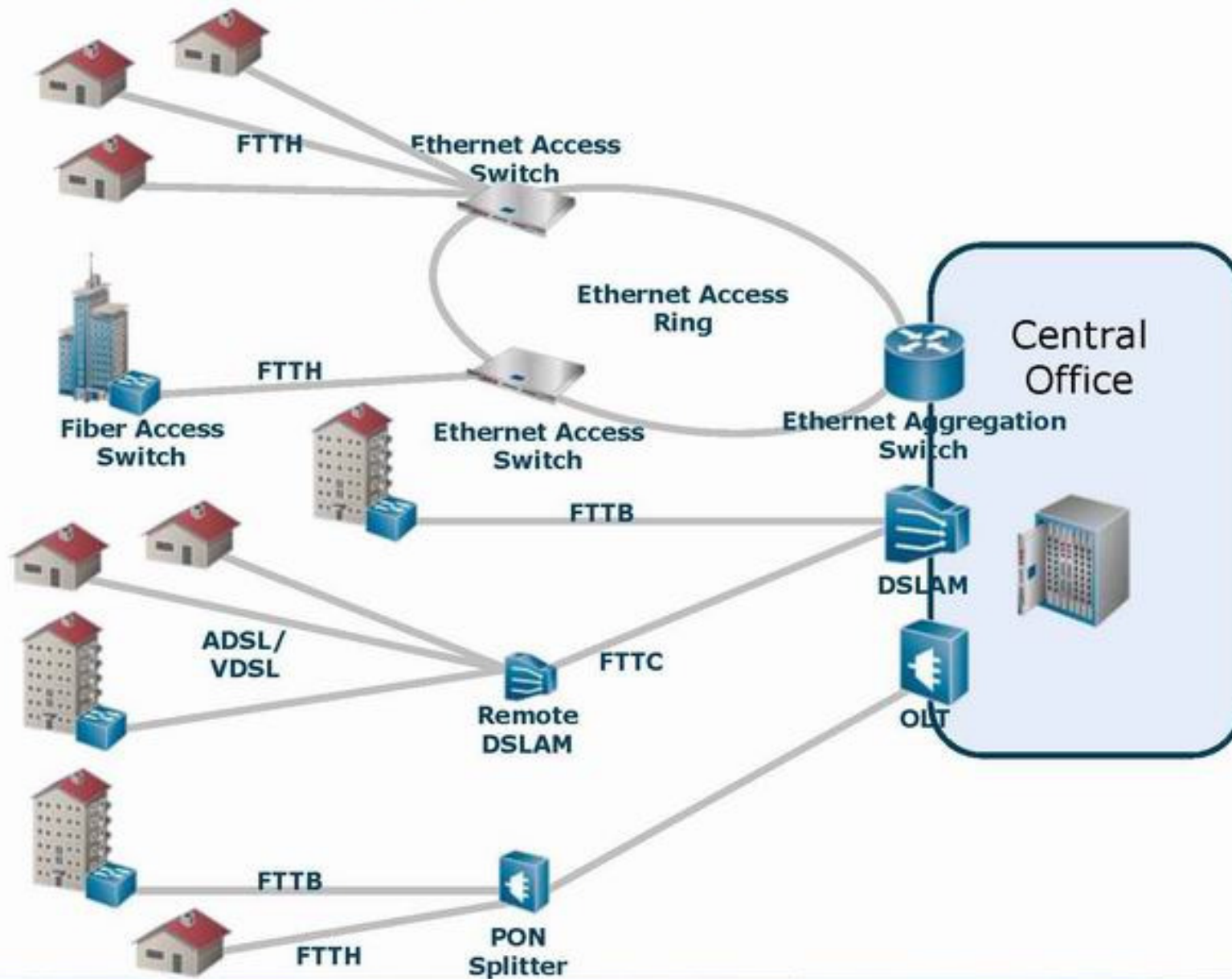
Service Convergence

Residential Services - Business Services - Wireless Services (FMC)

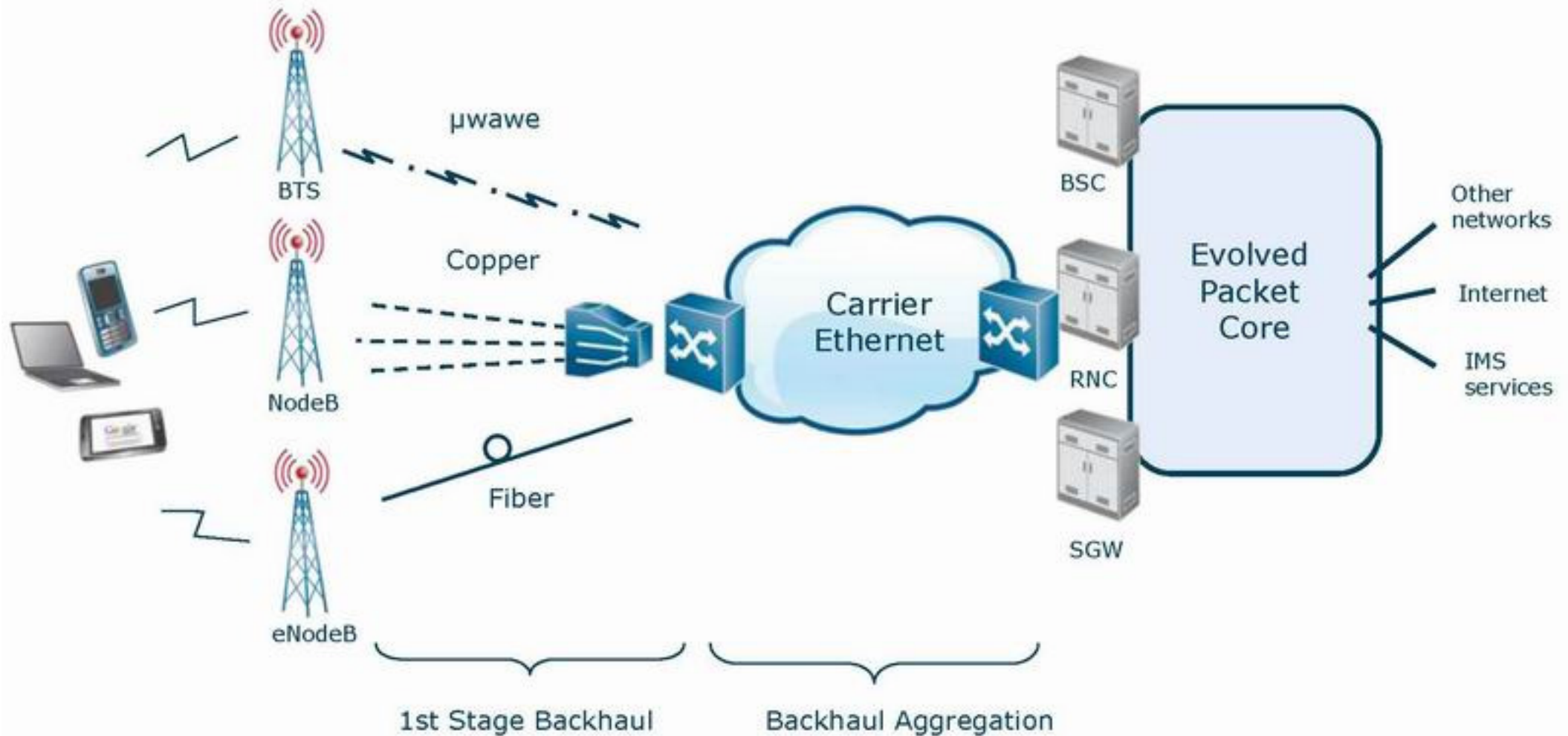
Some Industry Observations

- Shift towards a flexible access
- Shift to Point to Point Architectures – learn from history
- Global System Vendors evolving to Network Service Providers
- Unification is network convergence (!)
- Nordics Open Access Model Gaining Interest
 - Net neutrality is pushed by EU and US legislators
- (Carrier) Ethernet is becoming ubiquitous
- Huge network implications for IPTV and VOD
- ILECs on the Move
- Demographic profile mapping to technology
 - Rural Areas – GPON/EPON or FTTC (Fiber to the Node + VDSL)
 - Dense Areas- Active Ethernet

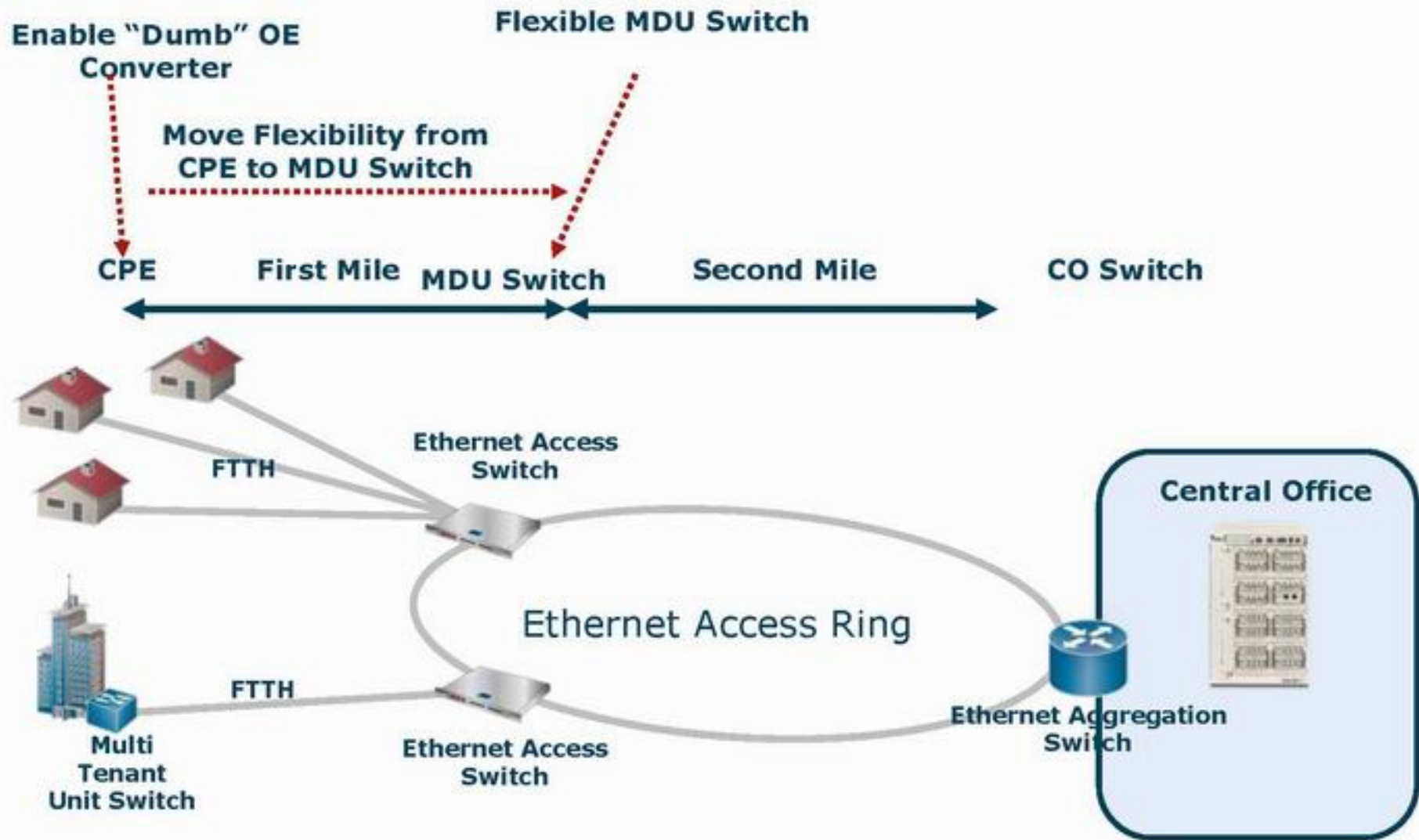
The Many Options of FTTx



Get Ready for 3G & LTE backhaul



Programmable Ethernet Access lowers the cost



Its about **total** cost of ownership

- Where is the cost?
 - 20-25 % per installed fiber-access port is related to system cost
- Introduction of programmable Ethernet Switching lowers the cost of CPE equipment
 - Low cost OE converter (~10-20 USD) with simple VLAN management to assign services instead of expensive GW CPE (~100-150 USD)
- Amortize the lower CPE cost over 24 or 48 MDU switch ports (i.e customer ports)
 - 90-140 USD x 48 (or 24) ports = 4320 – 6720 USD in savings
- Cost is CPE + MDU Switch cost
 - Total **cost savings** is **4320 – 6720** USD in total spread over 48 ports

Don't let G-PON become the next B-ISDN

What history tells us

- Technology has to scale
- Flexibility and technology headroom
- Ability to adopt to new services

Why Programmable FTTx?

Values for system vendors

- Integrates to various system architectures
- Enables feature differentiation
- Wirespeed performance for guaranteed number of instructions
- Unified architecture for LTE, EPON, GPON, Active Ethernet
- Cost reduction with fabric less configurations
- Deep buffers and advanced traffic management capabilities
- Small footprint enables ETSI-300 solutions

Turns into Service Provider benefits

- Low cost
- Lower OPEX with flexible service provisioning
- Mass deployments ahead of standards set
- Rapid new service introductions
- Common platform for business, residential access and mobile backhaul
- Extended product lifetimes gives lower CAPEX
- Scalability and room to grow
- Vendor interoperability

Value Chain Opportunities

Content Providers delivers new services enabled by the fiber access infrastructure



Application Differentiation

Service Providers evolves business models to improve ROI



Flexible Unified FTTx

System Vendors evolves to operate, run and maintain networks



Programmable Ethernet Switches

Chip Suppliers evolves to offer systems solutions

Unified Access - **Streamline** R&D

- Unified Access Switches
- Active Ethernet Switches
- FTTH/FTTC Switches
- MDU/MTU Switches
- xDSL Aggregation
- Microwave Aggregation
- GPON/EPON OLT Linecards and Systems
- Ethernet Access Devices for Business Access
- Stackable Aggregation Switches
- Intelligent GE/10GE MAC aggregation
- Enterprise Switch Chassis Linecards
- Enterprise Pizza boxes
- 3G/4G Wireless Backhaul Switches
- LTE Backhaul switches

Large Chassis



Small-Medium Chassis



Pizzabox



**Same HW
and SW
solution**

FTTx Design Option (1)

- Most Carrier Ethernet functions available in fixed-function Ethernet switch ASICs
- Customization in FPGAs

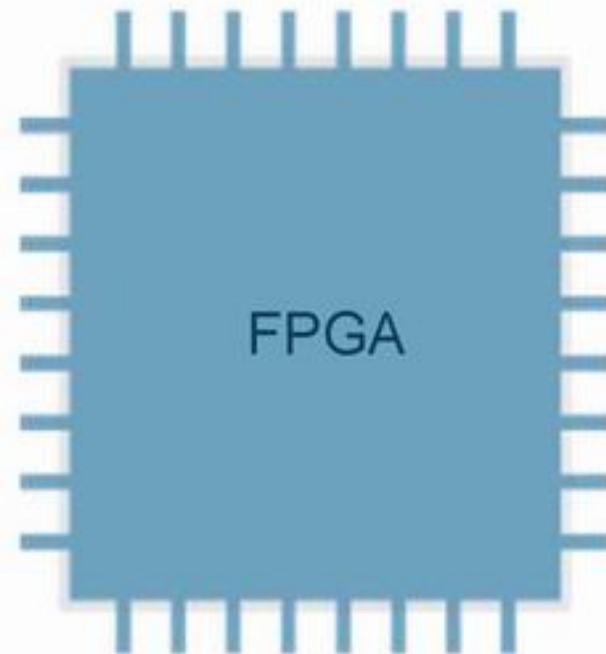


Reality Isn't Fixed...

- Subscriber Management Adoption
- Services Evolution
- Dynamic Filter Settings
- Control Plane Support
- Precision Time



+



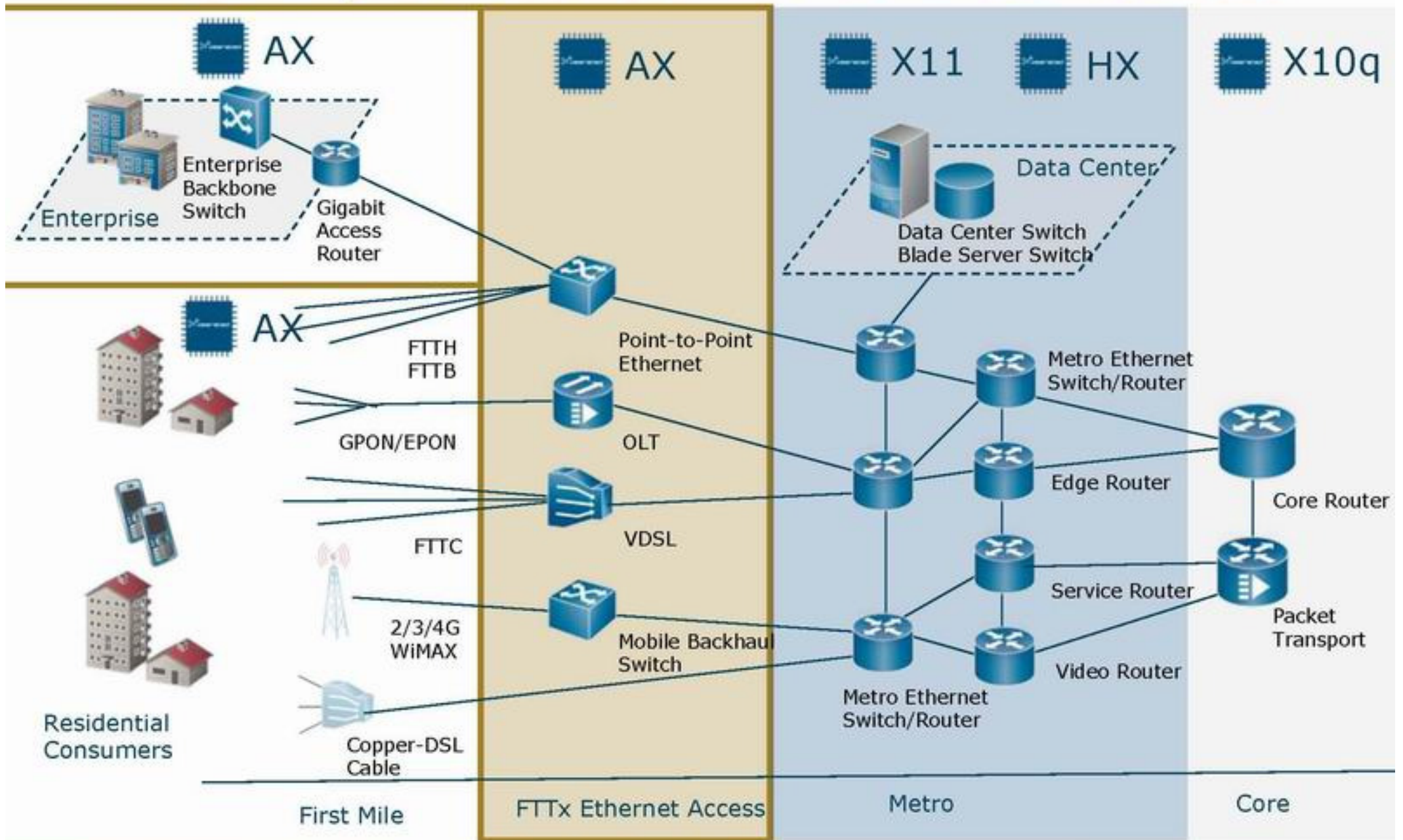
So FPGA based efforts tend to grow (out of budget)

The New Design Option

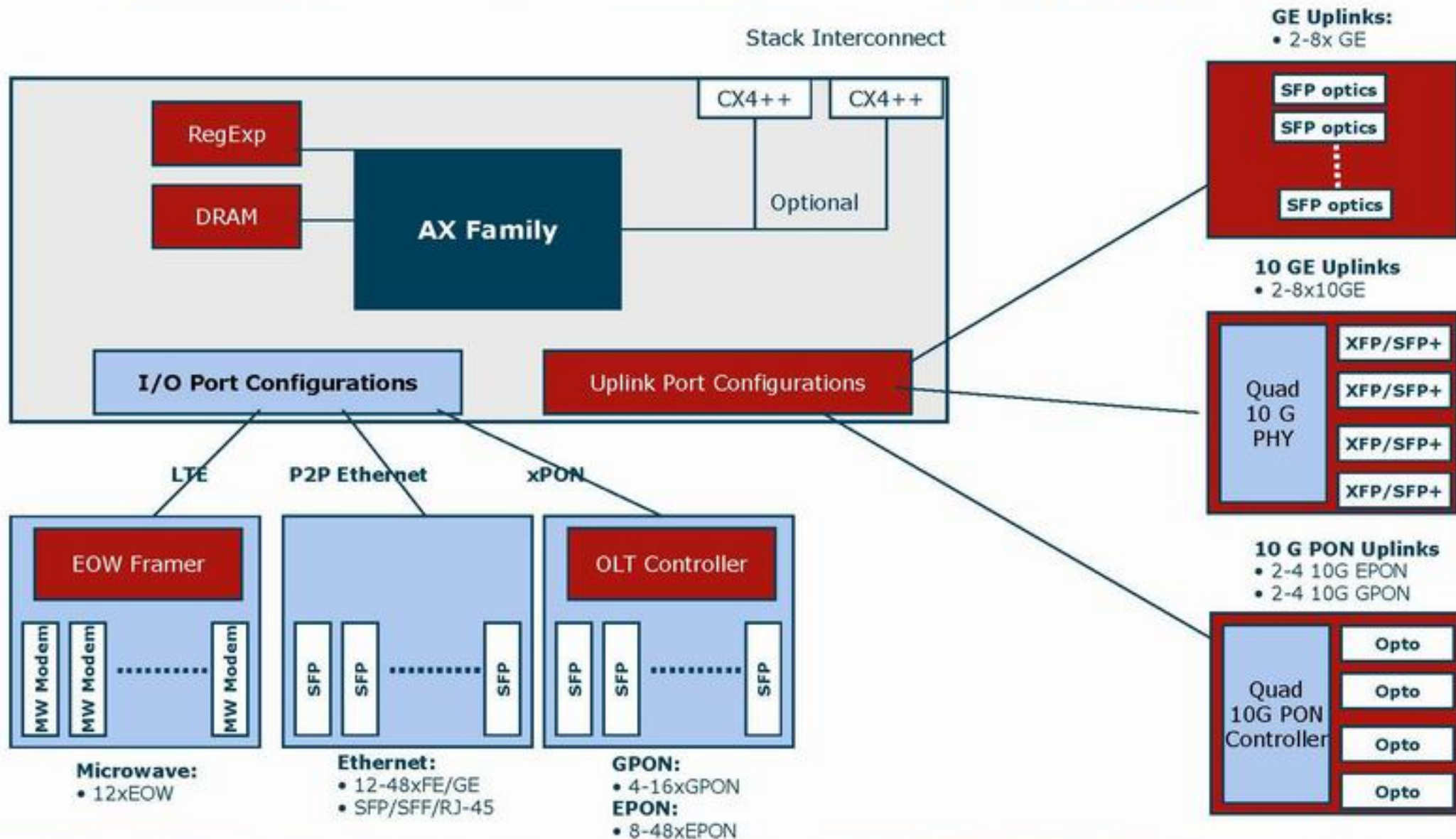
- Programmable Ethernet Switching
- Ethernet Switch + Pipeline of Processor cores
- Full Customization @ Wirespeed Performance
- Seamless Service Evolution
- Extended Lifetime



AX Family of Devices for Unified Access



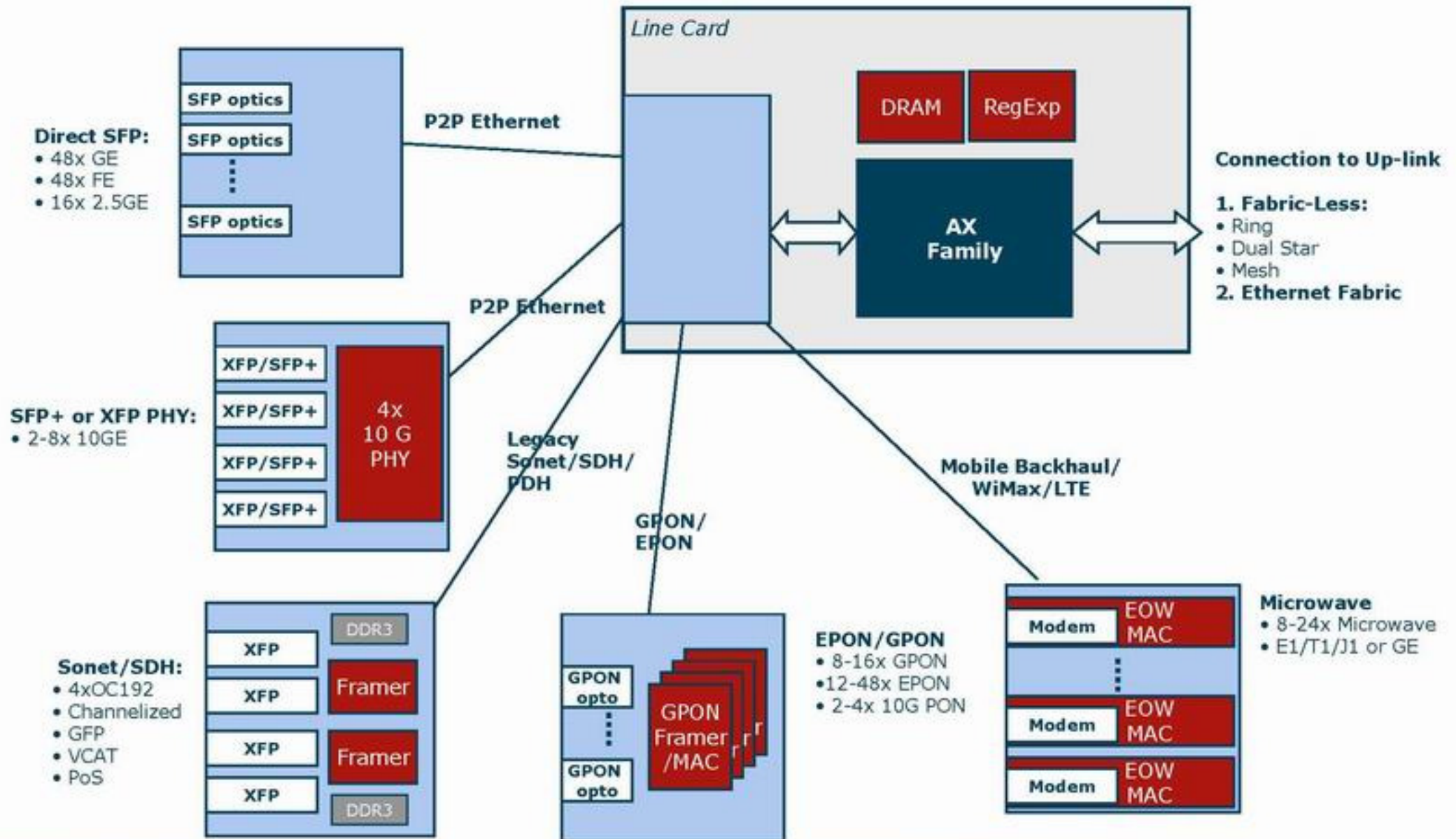
Unified FTTx Pizzabox Architecture



Unified FTTx Pizzabox Designs

- Unified Access Pizzabox
 - Active Ethernet PB
 - 24xGE + 2x10GE (AX210 or AX240)
 - 48xGE + 4x10GE (AX310 or AX340)
 - MDU Switch
 - FTTN/FTTC/FTTB
 - 24xGE + 2x10G PON (AX210 or AX240)
 - 48xGE + 4x10G PON (AX310 or AX340)
 - GPON PB
 - FTTN/FTTC/FTTB
 - 8xGPON + 2x10GE (AX210 or AX240)
 - 16xGPON + 4x10GE (AX310 or AX340)
 - Stackable Mid Range Enterprise Pizzabox
 - 24xGE + 2x10GE + 2 stacking ports (AX210 or AX240)
 - 48xGE + 4x10GE + 2-4 stacking ports (AX310 or AX340)

Unified FTTx Line Card solution



ESTI-300 Pizzaboxes

220 mm deep



Before we conclude:

“DSL won’t kill ISDN even in the next 50 years.”
Telstra ISDN product manager 2005

Conclusions. . .

... for Access Equipment Vendors

- Unified design to get cost right
- Programmability for customization and extended lifetime

... for Service Providers

- Programmability improves ROI
- CAPEX and OPEX significantly reduced

Xelerated – wirespeed by design

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