IMAGINING NEW TOMORROWS

Building fast, future-proof and efficient rural networks

TRUSTED FIRST

Network architecture and where ADVA fits

With the federal funding programs promising billions to make rural business broadband a reality, connecting main street is more achievable than ever. *But what comes next?*

Rural broadband providers have relied on Walker and Associates since 1970 to partner with them through industry changes, growth opportunities, and technology advances. We employ a customer-first, trusted-first focus, and have preserved that priority for 50 years. Among our most exciting offers is ADVA's innovative optical and Ethernet portfolio, built as the foundation for fast, future-proof & efficient rural business networks.

Network designs vary. To frame common requirements, the following six uses cases describe how ADVA transforms the network. A glossary of acronyms is provided at the end of the document.

Network Modernization
- Security
- Sync
- Assurance
- IT/OT Convergence

Communication Services
- Residential
- Commercial (Small Business)
- Wholesale

ADVA Solution Domains

1. Core Transport
2. Core Synchronization
3. Business Continuity
4. Metro Transport
5. Mobile Backhaul
6. Rural Broadband Services

Metro transport

Core transport network

Broadband services

Primary substation

Backup data center

Main office
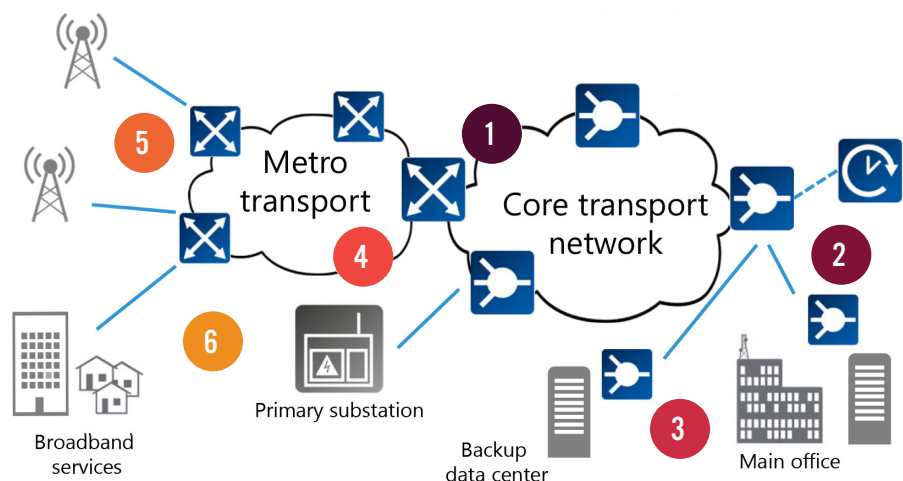
① Core Transport | Modular DWDM Transport

Flexible solutions for ruggedized packet-optical transport
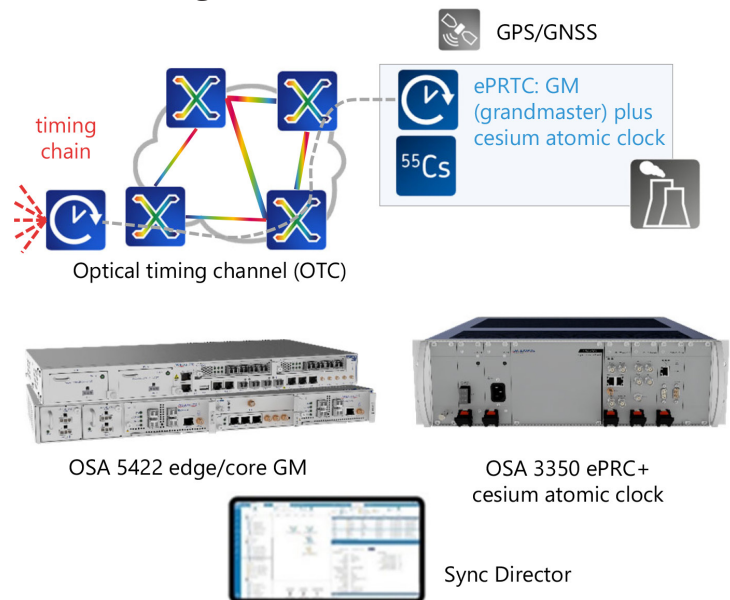
- Legacy SDH/SONET to optical/packet
  - ADVA: Flexible all-optical transport (DWDM)
  - EX: OTN Systems MPLS-TP and legacy interfaces

- FSP 3000 DWDM transport provides flexible optical layer and OTN aggregation

- Ease of operations with Ensemble Controller, Ensemble Optical Director as NMS

- Alternatively: DWDM-only or optical line system in combination with FSP 150 packet solutions for Ethernet connectivity

Legacy to packet conversion

FSP 150-XG400
Packet networks

Packet-optical
transport node

FSP 3000
Optical
transport
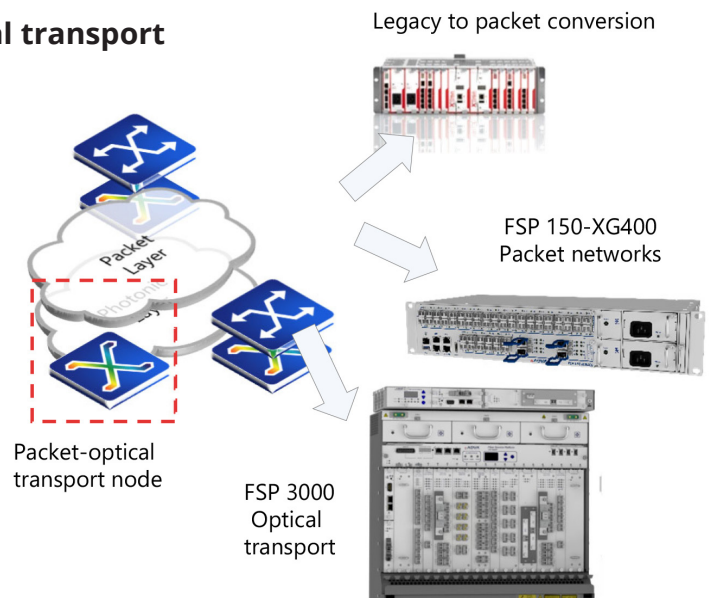
② Core Synchronization | Trusted PNT/Timing Assurance

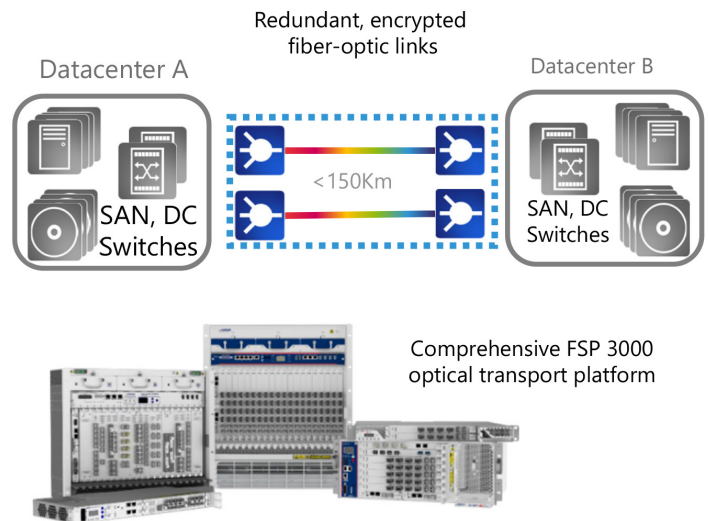**Enhanced primary reference clock (ePRTC) from core to edge**

- Core clocks: Core GNSS/PTP GM combined with backup optical cesium atomic clock

- PNT backup clocks: Independent cesium serving verified PTP network feeds

- Optical timing channel: Bi-directional out-off-band PTP traffic delivered to boundary clocks at network edge

- Boundary edge clocks: OSA 5422 GM timing slaved clocks at substations

- Intelligent sync management application: Ensemble Controller, Optical Director and Sync Director

GPS/GNSS

timing chain

ePRTC: GM
(grandmaster) plus
cesium atomic clock

^{55}Cs

Optical timing channel (OTC)

OSA 5422 edge/core GM

OSA 3350 ePRC+
cesium atomic clock

Sync Director

③ Business Continuity | Mission Critical Design and Applications

**Scalable Open Line and DWDM systems**

- Wide range of interfaces such as 32G fiber channel, 10G RoCE, OTN, 10G/100G Ethernet

- Highly-resilient architecture featuring hardware-redundancy as well as fiber and link protection

- Data protected by post-quantum secure AES 256 low-latency, line-rate encryption

- Qualified with leading provider of SAN and data center solutions such as IBM, Brocade and Dell/EMC

- Highest energy efficiency

Redundant, encrypted fiber-optic links

Datacenter A

Datacenter B

SAN, DC Switches

<150Km

SAN, DC Switches

Comprehensive FSP 3000 optical transport platform

④ Metro Transport | Scalable Packet Transport Networks

Common transport network for IT and OT applications and xHaul
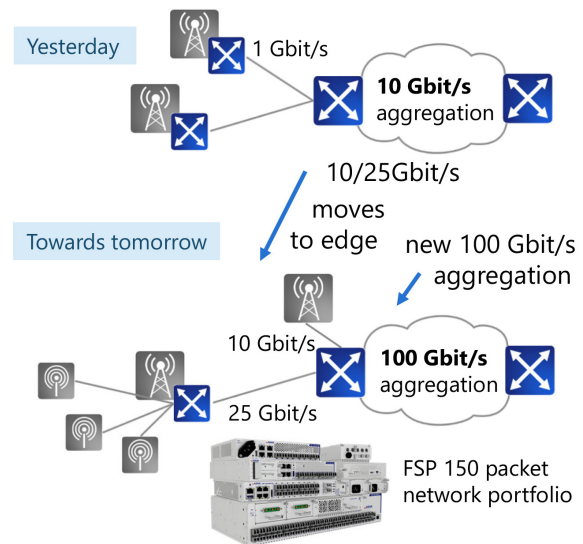
- Growing networks from Gbit/s to 10Gbit/s and 100Gbit/s

- Meeting security, resilience and synchronization requirements

- Operational simplicity by comprehensive OAM capabilities and powerful NMS

- Flexible solution portfolio covering ultra-compact edge devices to high-capacity aggregation nodes

- Environmentally hardened designs

Sync

Metro transport

Packet-optical core transport

FSP 150 packet network portfolio
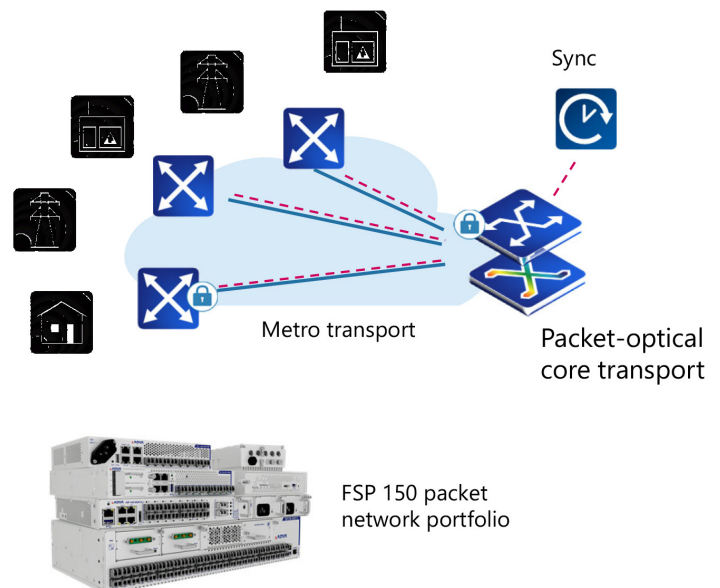
5   Mobile Backhaul | Seamless Aggregation to 100Gbits/s

Efficient and affordable leap to 5G

- 5G NR with 10Gbit/S and 25Gbit/s network interfaces

- Densification creates need to overcome bandwidth bottlenecks in RAN aggregation network

- Seamless growth with environmentally hardened, compact 10G and 100G devices

Yesterday
1 Gbit/s
10 Gbit/s aggregation
10/25Gbit/s moves to edge
Towards tomorrow
new 100 Gbit/s aggregation
10 Gbit/s
100 Gbit/s aggregation
25 Gbit/s
FSP 150 packet network portfolio

6   Rural Broadband Services | Low-Cost and Flat Network

Valuable fiber network public bandwidth services

- From 1GbE to 10GbE and 100GbE service demarcation devices

- Value-adding features such as encryption, synchronization, routing, local hosting of VNFs

- Reliable, cost-efficient, and widely deployed products, applied with leading service providers

- Powerful management system Ensemble Controller simplifies operation and provides transparent control

Metro transport

FSP 150 packet network portfolio
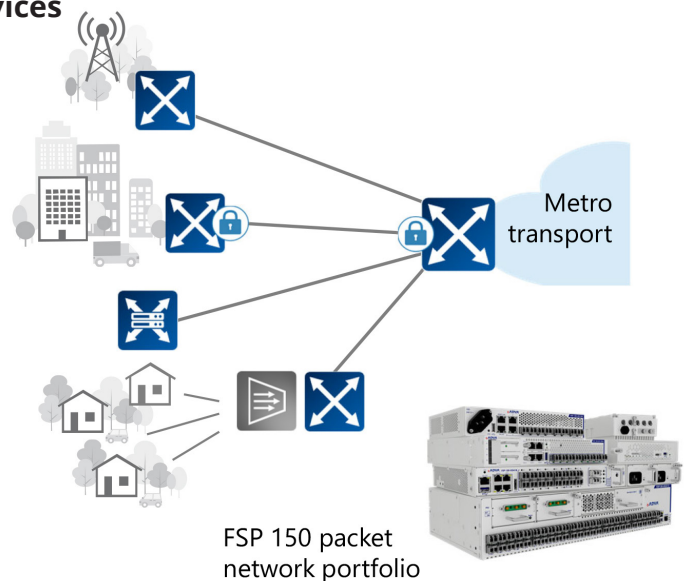
GLOSSARY OF ACRONYMS

AES – Advanced Encryption Standard

DWDM – Dense Wave Division Multiplexing

GbE/s – Gigabit Ethernet per second

GNSS/PTP GM – Global Navigation Satellite System / Precision Time Protocol Grand Master Clock

IT – Information Technology

NMS – Network Management System

OAM – Operations, Administration & Management

OTN – Optical Transport Networking

PNT – Position, Navigation and Timing

RAN – Radio Access Network

SAN – Storage Area Network

SDH/SONET – Synchronous Digital Hierarchy / Synchronous Optical Network

VNFs – Virtual Network Functions