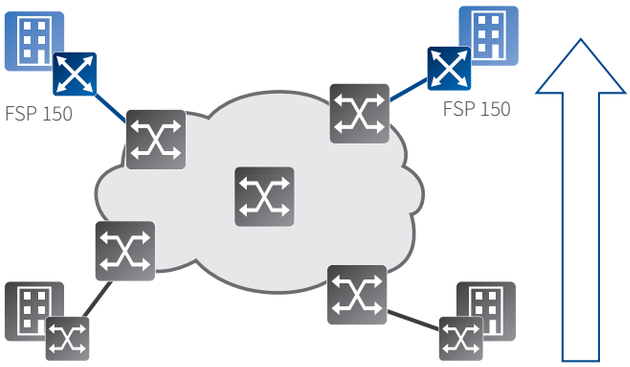
Empowering the network edge

Streamlining high-value service delivery

ADVA™
Optical Networking

Communication service providers (CSPs) are experiencing growing demand for high-value communication services that combine simple connectivity services with add-on capabilities such as security, IP OAM, MPLS support, timing delivery or virtual network functions (VNFs) hosting. Transforming those emerging business opportunities into profitable revenue streams depends on simple and easy to integrate network solutions.

At ADVA Optical Networking, we're helping our customers respond to this increasing demand with a unique family of network edge and aggregation devices. Our market leading portfolio combines a comprehensive set of services capabilities with a common, open and programmatic management approach.
Covering a wide range of connectivity technologies and transmission media, our products can support any business opportunity.



FSP 150 edge-empowered network

With FSP 150

- Multi-layer demarcation
- Multi-layer OAM
- Encryption
- Synchronization
- NFV hosting
- 100G services

Service innovation starts at the edge

In the old world of stove pipes, service providers might need to upgrade their entire network when rolling out a new service. This total network overbuilt involves each and every network element. Hence, this approach is slow, expensive and unnecessary. Why? Because services start at the edge of the network, so that's where innovation should be applied.

In an alternative approach, the service provider can simply add a flexible device at the edge, which is capable of producing the service on top of an existing network. This edge enablement has operational advantages. More importantly, there are significant cash flow benefits as upfront costs are minimized and investment is closely linked to new revenue streams.

There are various opportunities for adding service-creating capabilities at the network edge. Edge hosting of VNFs enables the introduction of network functions virtualization (NFV) focusing on the most prominent virtual customer premises equipment (vCPE) use case, without the need to implement large scale server clouds. Instead, an operator simply installs edge computing devices on the customer premises. Security functions at the edge enable CSPs to offer end-to-end security, even across untrusted networks. Timing capabilities at the edge extend the service portfolio with synchronization capabilities, without having to upgrade the connectivity network. And these are just some of the benefits of edge-empowered service innovation.

A single product family that can support any business opportunity

How CSPs create value at the edge

Innovation is about creating value from change. Enterprises need communication networks with unique characteristics for their size, vertical and strategy. As they push data and applications into the cloud, connectivity services need to become more agile and secure. The emergence of NFV replaces established hardware-centric network design with open server-based solutions. What's more, a growing number of appliances now require highly precise synchronization.

As a result, there is tremendous shift in network requirements. CSPs need to master the challenge of building new capabilities with an established network, an existing workforce and proven processes. Our market leading FSP 150 portfolio was specifically designed for this transformation process. The edge-centric approach leverages installed networks, minimizes impact with initial deployments and creates change as penetration grows.

Network demarcation self-test

1. How many different suppliers of edge devices and CPEs are deployed in your network?
   - ★ 1
   - ⯪ 1 – 6
   - ☆ > 6
2. Can you add new services with a mouse click?
   - ⯪ yes
   - ☆ no
3. Do your customers consider your network a trusted environment?
   - ⯪ yes
   - ☆ no
4. Does your present supplier provide 100G MEF CE 2.0 compliant demarcation?
   - ⯪ yes
   - ☆ no

★ 10 points	⯪ 5 points	☆ 0 points

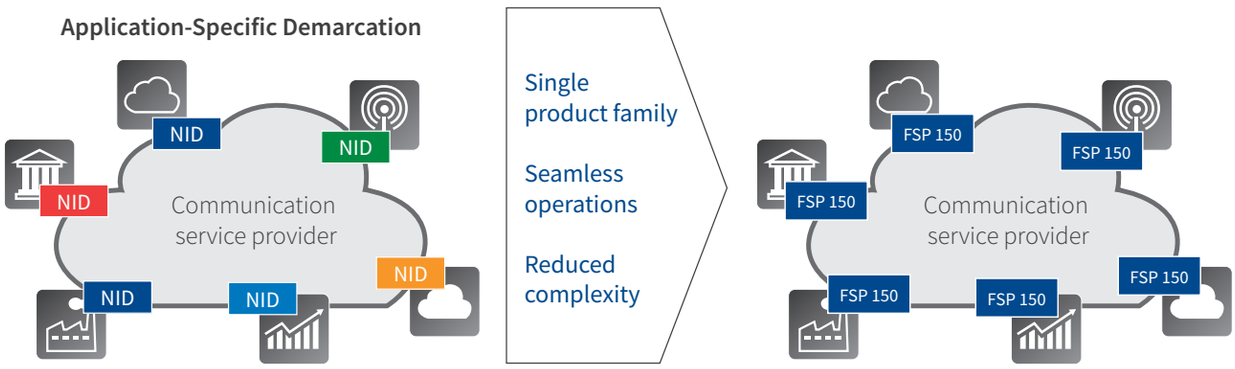
Mor than 10 points:
Great! You're already using our products.

10 points or fewer:
There's potential for higher revenue and lower costs. Keep reading …

Carrier Ethernet and IP demarcation

CSPs offer a wide range of connectivity services to their enterprise customers but also as wholesale services to other CSPs. Different types of services are implemented with a range of demarcation products and this creates complexity in logistics, network management integration and skill development, among many other cost-creating factors.

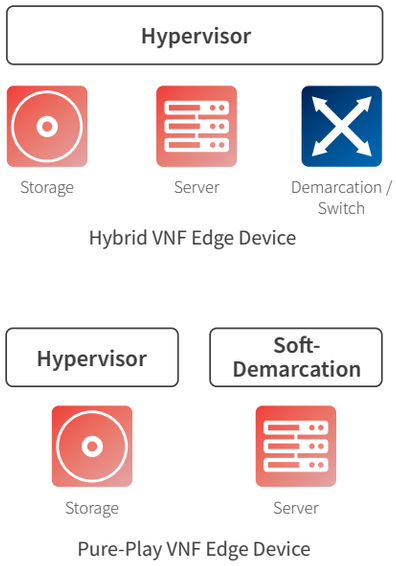
A single product family with a comprehensive set of features can have a tremendous positive impact on the business case. Less effort and cost needs to be spent supporting multiple services that are operated with different management tools and that require great effort with system integration and testing.



VNF edge hosting

CSPs are eager to benefit from NFV by replacing hardware appliances with software. VNFs hosted on standard servers enable fast and efficient service delivery and innovation. Servers can be installed in central data centers or at the edge of a network on a customer premises or a cell site. CSPs frequently operate active equipment deployed on thousands or even tens of thousands of sites and so minimizing the number of hardware devices at those sites can have a major impact on cost.

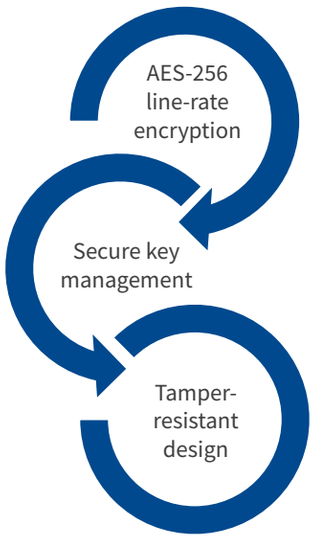
Integration of servers with demarcation technology meets this need. There are two different approaches to it. A software-based demarcation appliance can run on a server or, alternatively, it can be provided in hardware by a hybrid network element integrating server capacity. Hybrid devices are the ideal solution for applications with high performance requirements, while applications with relaxed demand are more cost-efficiently addressed with pure-play common off-the-shelf (COTS) servers.



Security

CSPs frequently struggle to meet customer demand for cloud service security. Customers want to host data or applications in the cloud data center but are reluctant to transport sensitive data across public or third-party networks, which are considered to be untrustworthy environments. There is an easy solution. Highly secure AES-256 encryption algorithms applied at the Ethernet or IP layer can protect user data as well as control and management traffic. Encryption can be implemented in hardware for highest performance and lowest latency or cloud-natively in software to meet stringent cost targets.

A security control is only as secure as the applied key exchange and key storage mechanisms. Our FSP 150 edge devices complement encryption with tamper-resistant design and a trusted compute platform for secure storage of keys and for software attestation.



Versatility and scalability

Enterprises can be connected to communication networks in many ways. Fiber delivers the highest bandwidth, but is not available at all sites. The latest DSL technologies can achieve Gbit/s speeds, provided distances to the central office or active curb sites are low. To support fast service delivery and the business advantage of software-based service rollout, wireless and mobile access can be used to complement fixed access networks.

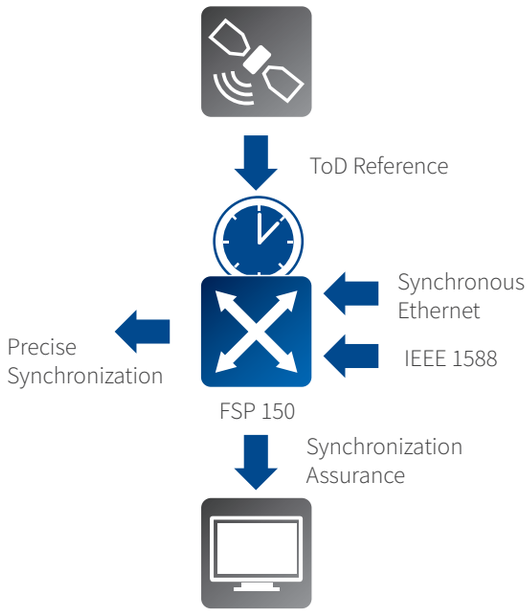
While medium-sized enterprise sites are connected with speeds of several 100Mbit/s up to 1Gbit/s, there are data center and central hub locations with very high bandwidth requirements ranging up to several tens and sometimes to 100Gbit/s. In consequence, there is a need for compact and cost-efficient 100Gbit/s demarcation devices as well as edge aggregation solutions scaling up to Tbit/s. Our FSP 150 solution portfolio comes with a rich set of interface options meeting any bandwidth and time-to-service requirement.

ConnectGuard™ encryption increases the value of established connectivity services

Synchronization and timing

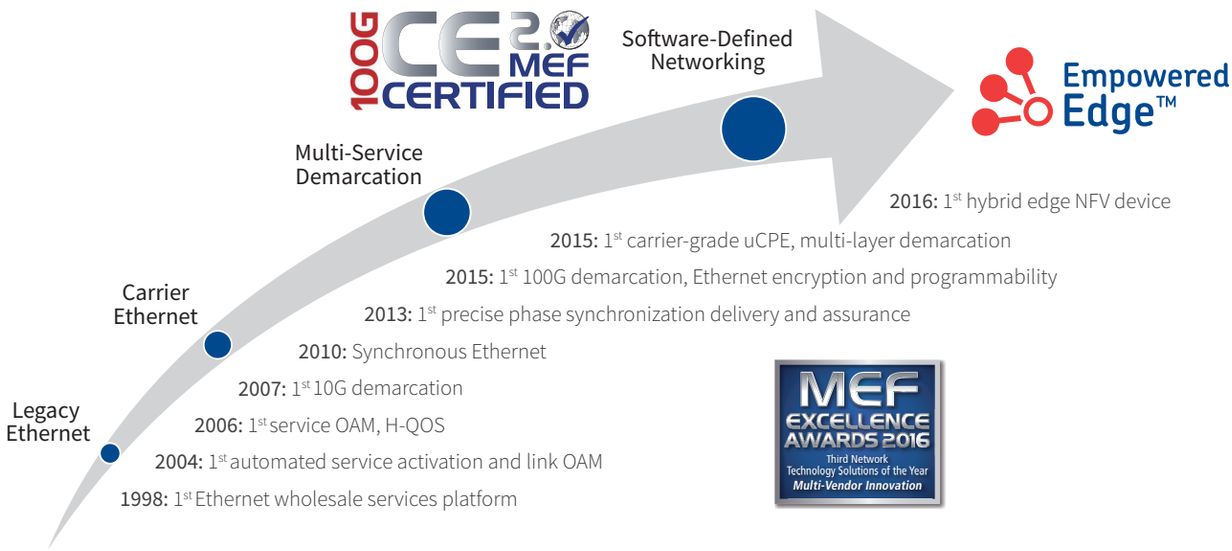
High-precision application timing is required in various market verticals such as mobile, energy and finance. In energy distribution networks, synchronous measurement of voltage and current enables operators to accurately locate failures and initiate protection switching. In mobile networks, synchronization is vital for high spectral efficiency, TDD-modes or advanced LTE and 5G features among others. New regulatory requirements are forcing financial institutions to accurately timestamp trading records.

Packet-based timing distribution can be applied on top of existing networks by simply adding synchronization delivery capabilities at the edge of the network. For highly precise, assured synchronization, more sophisticated functions such as Global Navigation System (GNS)-supported edge grandmasters can be applied. Our FSP 150 solution comes with a range of functions for a seamless supply of timing at the edge of the network.



Our experience – your opportunities

Our comprehensive FSP 150 family of demarcation and aggregation devices simplifies operation and service creation. For decades, we've been a demarcation technology leader. Built on organic growth and strategic acquisitions, our comprehensive solution portfolio makes a range of proven functionalities available and offloads CSPs from troublesome integration of distinct network products.



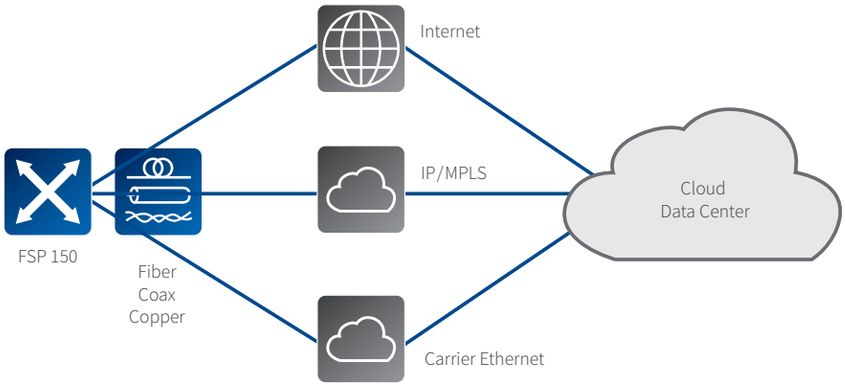
Application overview

1. Cloud access

MMoving content into the cloud demands fast and elastic cloud access. CSPs operate Carrier Ethernet and MPLS networks to connect their customers. With the transition from traditional applications to cloud services, even large CSPs will face the challenge of connecting off-net sites through third-party networks in an assured, secure way. While in many cases fiber is used to connect business customer locations, copper connectivity is still utilized for moderate bandwidth requirements and on-site connections. This diversity of scenarios, defined by fiber- and copper-based as well as on-net and off-net access, creates the need for a versatile demarcation technology. CSPs favor demarcation solutions that combine Carrier Ethernet, MPLS and IP capabilities with tunneling technologies such as VXLAN, secure data encryption and performance assurance. This enables them to use a single product family with a common management approach, rather than investing in integrating a variety of edge solutions. As demarcation devices can utilize mobile networks for initial turn-up and service delivery, CSPs can offer services even before fixed network access is provisioned. This enables rapid service rollout and also supports fast delivery of virtualized applications at the edge, where services have traditionally been delivered on hardware.

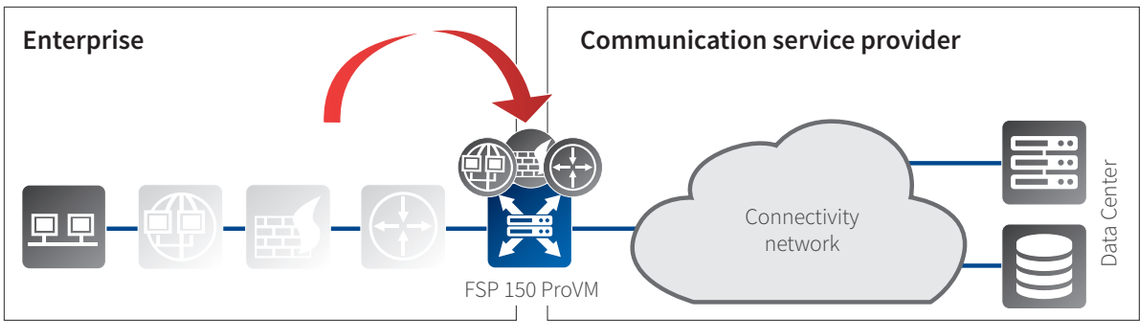
Essential use cases

1. **Cloud access:** connecting customer sites over any infrastructure
2. **vCPE use case:** growing business with managed services
3. **Security as a service:** making public networks a trusted environment
4. **Digitizing cable networks:** lowering transport cost and improving scalability



2. vCPE use case

NFV is now a reality and vCPE is the most promising use case. Enterprise IT components can be implemented as software appliances running on standard servers. Having those servers also integrated with demarcation technology creates a lot of advantages as service providers only need to install a single network element on the customer premises at the edge of the network. Service activation is performed remotely and new services can be introduced in minutes rather than months. Since edge devices need to respond to movements of data and appliances from one data center to another, open programming interfaces, including OpenFlow, MEF Presto and NETCONF/YANG, support automated reconfiguration.



3. Security as a service

Security of data and networks is the most significant challenge of our information society. As network complexity increases, the attack surface gets larger. CSPs and their customers are responding by adding security controls to their networks. As transport networks run over public and third-party infrastructure, those networks are generally not trusted. Therefore, all communication must be protected and all data in motion needs to be encrypted.

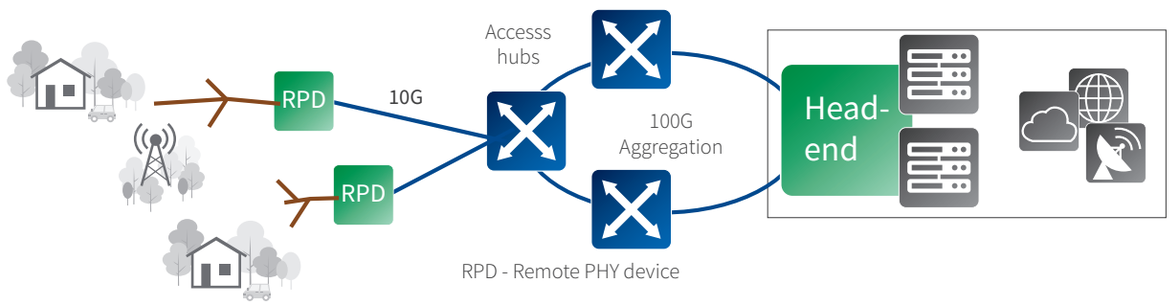
Up to now, most connectivity services transport user data without protection because current encryption technologies are thought to add considerable cost and complexity and also impact performance by adding latency and jitter

Our ConnectGuard™ end-to-end encryption makes a big difference as it protects all traffic at line-rate with negligible latency right at the interface. It secures traffic transparently over existing Ethernet networks, which makes it ideal for offering security as an additional feature to increase the value of established connectivity services.

A one-stop shop for edge devices

1. Multi-layer demarcation: handing-off Carrier Ethernet 2.0, IP, MPLS services with up 100 Gbit/s
2. VNF hosting: rapid service innovation with edge hosting of VNFs
3. Fiber, copper and LTE: multiple media options for connecting to the network edge
4. Security: protected connection to the edge site with line-rate, low-latency encryption
5. Synchronization: assured delivery of precise timing

4. Digitizing cable networks



Cable network with distributed access architecture (DAA)

Cable networks are constantly evolving to meet increasing demand for bandwidth and innovative services. But there are inherent limitations with the existing HFC architecture, mainly caused by analog optical RF transmission from the headend to the fiber node. The transition to pure-play digital transmission marks a turning point, which opens up various options for architectural improvement.

Digital networks can bridge larger distances and can efficiently support service aggregation. Digitization favors a Fiber Deep architecture as well as headend centralization; both trends are improving network economics but create a need for high-capacity packet transport at the edge. Remote PHY devices (RPD) with 10Gbit/s network interfaces will connect to aggregation sites for 100Gbit/s headend connections. Our MEF-certified CE 2.0 technology provides the ideal solution for this application, introducing sophisticated OAM capabilities as well as significantly improved resilience by means of standardized service protection.

Preparing for tomorrow

Our market-leading solution for the network edge combines many value-generating capabilities such as service intelligent demarcation, synchronization delivery, security and application hosting in an unprecedented way. It empowers CSPs to harmonize their access infrastructure and extend their service offering, enabling them to meet current needs while preparing for future customer demand.

This single family of demarcation products simplifies operations and service creation

Getting more from your network with powerful edge solutions

For more information

ADVA Optical Networking SE
Campus Martinsried
Fraunhoferstrasse 9 a
82152 Martinsried / Munich
Germany

ADVA Optical Networking North America, Inc.
5755 Peachtree Industrial Blvd.
Norcross, Georgia 30092
USA

ADVA Optical Networking Singapore Pte. Ltd.
25 International Business Park
#05–106 German Centre
Singapore 609916

Version 11/2017

About ADVA Optical Networking

ADVA Optical Networking is a company founded on innovation and driven to help our customers succeed. For over two decades our technology has empowered networks across the globe. We're continually developing breakthrough hardware and software that leads the networking industry and creates new business opportunities. It's these open connectivity solutions that enable our customers to deliver the cloud and mobile services that are vital to today's society and for imagining new tomorrows. Together, we're building a truly connected and sustainable future. For more information on how we can help you, please visit us at: www.advaoptical.com.

ADVA™ Optical Networking