

FSP 150 ProVMe series

Multi-layer demarcation and NFV hosting

Edge NFV creates many opportunities for revenue growth and equipment consolidation, but it also brings challenges. Customer premises and cell sites are remote, the cost of repair is high and the scale out is huge. Edge NFV requires robust management, remote testing and diagnostics, and in service monitoring to keep OPEX under control.



Our FSP 150 ProVMe series enables service providers to bring NFV to existing L2/L3 connectivity services, with value-added offers such as managed routers, firewalls, WAN acceleration and SD-WAN. It minimizes truck rolls by combining the world's most popular L2/L3 service demarcation solution with high-performance and self-contained NFV infrastructure. The FSP 150 ProVMe extends the proven benefits of remote testing and monitoring, and a highly reliable management channel to cover NFV hosting. Both the hosting platform and the service layers are monitored, status is reported, and faults can be remotely diagnosed and repaired. What's more, our FSP 150 ProVMe provides open, standardized interfaces, hardware encryption and comprehensive timing distribution.



Your benefits

- ✔ **Single-box solution**
Open platform for VNF and true multi-layer business service demarcation
- ✔ **ConnectGuard™ security**
Advanced security functions such as encryption, access control lists and secure authentication
- ✔ **Pluggable server**
L2/L3 demarcation unit that can be upgraded with an NFV server; choose the server capacity that best fits and upgrade it later without replacing the base unit
- ✔ **HW-accelerated virtualization**
Tight integration between server and physical switch improves performance and offloads the server to free resources for revenue-generating appliances
- ✔ **Open interfaces**
Based on OpenStack, REST, NETCONF/YANG and OpenFlow
- ✔ **End-to-end service assurance**
Intelligent IP service demarcation point compliant with the latest OAM standards

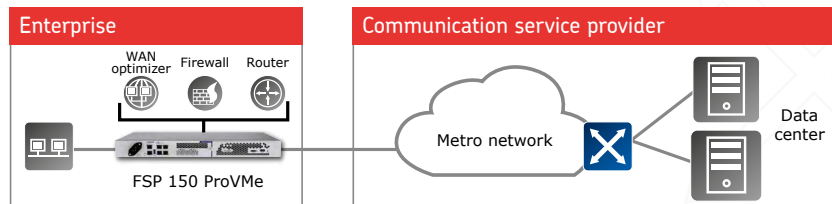
FSP 150 ProVMe series at a glance

	Product	Key application
	FSP 150 ProVMe (P2.4)	Cost-optimized edge NFV hosting. Can be deployed as a NID initially and upgraded with a hot-swappable server without affecting running services. Various server choices enable operator to size performance and upgrade when needed.
	FSP 150 ProVMe (F2.6)	Provides more specialist functions such as synchronization, ConnectGuard™ encryption and higher-scale NID functions. Also provides carrier class dual hot-swappable power supply units and full industrial temperature operation for cell sites and other harsh environments.

Applications in your network

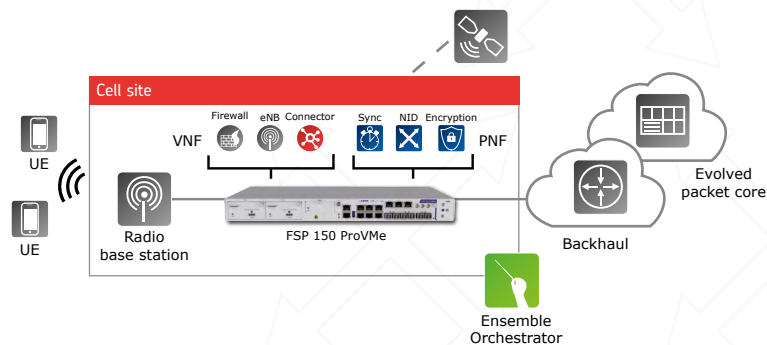
Assured robust vCPE hosting

- Open support for a wide range of VNFs including CE routers, firewalls and WAN acceleration
- Operational savings / reduced truck rolls
- Protection against end user access to operating system



Complete cell site virtualization

- Open support for a wide range of VNFs including cell site gateway and network tests
- HW-based synchronization for accurate phase and frequency distribution
- Industrial temperature range for deployment in street cabinets



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Product specifications are subject to change without notice or obligation.

FSP 150 ProVMe series overview

	FSP 150 ProVMe (F2.6.x4) ¹	FSP 150 ProVMe (F2.6.x4.C) ²	FSP 150 ProVMe (F2.6.x8.C.S) ³	FSP 150 ProVMe (P2.4) ⁴
Server	Xeon-D 4 Core	Xeon-D 4 Core	Xeon-D 8 Core	Hot pluggable Xeon-D 2,4 Core
PSU redundancy	Dual pluggable	Dual pluggable	Dual pluggable	1x fixed + 1x external
Fan	Hot pluggable	Hot pluggable	Hot pluggable	Hot pluggable; fanless if NID only
ConnectGuard™	—	Yes	Yes	—
Synchronization	—	—	Yes	—
I-Temp -40 to +65C	—	—	Yes	—

Access capacity

- Two⁴/Four^{1,2,3} 10/100/1000BaseT or 100/1000BaseX (SFP) ports

Network interface

- Two 10/100/1000BaseT or 100/1000BaseX (SFP)
- One network port can be defined as access

Network interface redundancy

- IEEE 802.3ad link aggregation
- ITU-T G.8032 Ethernet ring protection

Hosting capability

- Fully open architecture supports wide range of VNFs
- Hot pluggable⁴ or fixed^{1,2,3} server options
- High-performance Intel Xeon-D x86 CPU. Up to 8 cores
- Up to 16 GBytes DDRAM, 128 GB of host SSD
- Up to 1TB SSD for application data storage with isolation from host
- KVM hypervisor, OVS, SR-IOV, DPDK
- Independent supervision processor installs and monitors BIOS, OS and other host components
- Expandable via PCIe^{1,2,3}, eSATA⁴ and USB interfaces

Synchronization³

- ITU-T G.8261 / G.8262 / G.8264 SyncE
- IEEE 1588v2 Precision Time Protocol
- ITU-T G.8265.1 and G.8275.1 PTP Telecom Profile
- BITS-in and BITS-out, BITS sync status messaging
- Syncjack™ sync performance monitoring

VLAN support

- 4096 VLANs and stacked VLANs
- 2-tag management (push/pop/swap) for c-/s-tag
- 32⁴/64^{1,2,3} Ethernet virtual circuits (EVC)
- 9612 byte-per-frame MTU transparency
- EoMPLS encapsulation

Layer 2 traffic management

- Acceptable client frame policy: tagged or untagged
- Service classification based on IEEE 802.1p, 802.1Q and IP-TOS/DSCP
- VLAN tag priority mapping
- MEF-compliant policing
- Port shaping, MEF 10.3 hierarchical policing
- DiffServ supporting WFQ/SP mix

Layer 3 traffic management

- Programmability by OpenFlow
- L2-L4 access control lists (ACL) for classification
- VRF-lite virtual routing and forwarding
- DHCP relay agent

Operation, administration and maintenance (OAM)

- TWAMP
- IEEE 802.3ah EFM-OAM link management
- Hardware-assisted IEEE 802.1ag CFM
- ITU-T Y.1731 performance monitoring
- ITU-T Y.1564 service activation and testing
- Embedded RFC 2544 test generator and analyzer
- Embedded VNF test generator and analyzer
- Terminal and facility loopbacks
- Electrical cable diagnostics with benchmarks
- MEF-compliant Layer 2 control protocol disposition
- Link loss forwarding
- Dying gasp message as EFM-OAM and SNMP trap
- Port mirror with timestamp³, truncate and filter

Performance monitoring

- Monitoring of end-to-end services, service graphs and individual VNFs
- Server performance metrics
- RFC 2819 RMON etherstats
- 15-minute and 1-day performance data bins
- IEEE 802.3ah/ITU-T G.8021 PHY level monitoring

- ITU-T Y.1731 single- and dual-ended frame loss measurement
- Synthetic frame loss and delay measurement
- TWAMP sender/reflectors
- Multi-CoS monitoring
- Threshold-setting and threshold-crossing alerts
- Physical parameter monitoring for SFP optics, including TCAs

ConnectGuard™ security^{2,3}

- L2 MACsec encryption at line rate on a per-EVC basis
- End-to-end encryption mode with one or two clear VLAN tags
- Robust AES encryption algorithm
- Key distribution based on IEEE 802.1X
- Diffie-Hellmann key exchange process
- Tamper resistant and evident enclosure

Low-touch provisioning

- DHCP/BOOTP auto-configuration
- IEEE 802.1x port authentication
- Text-based configuration files
- TFTP/SCP for software image and configuration file

Management and security

Local management

- Serial connector (RJ45) using CLI
- Local LAN port (RJ45) using CLI, SNMP and Web GUI
- 3G/LTE/WiFi USB interface

Remote management

- Maintains in-band VLAN and MAC-based management tunnels
- Fully interoperable with FSP 150CM, FSP 150EG-X and other FSP 150 products

Virtual infrastructure management

- OpenStack
- ADVA Neutron plugin allowing full control of physical and virtual data paths

Management protocols

- IPv4 and IPv6 DCN protocol stacks, including dual-stack operation and 6-over-4 tunnels
- Telnet, SSH (v1/v2), HTTP/HTTPS, SNMP (v1/v2c/v3)
- NETCONF/YANG, OpenFlow v.1.3.4

Secure administration

- Configuration database backup and restore
- System software download via FTP, HTTPS, SFTP or SCP (dual flash banks)
- Remote authentication via RADIUS/TACACS
- SNMPv3 with authentication and encryption
- IPsec on management traffic
- Access control list (ACL)

Product Legend

¹ FSP 150 ProVMe (F2.6.x4)

² FSP 150 ProVMe (F2.6.x4.C)

³ FSP 150 ProVMe (F2.6.x4.C.S)

⁴ FSP 150 ProVMe (P2.4)

IP routing

- DHCP, RIPv2 and static, ARP cache access control

System logging

- Alarm log, audit log and security log

Regulatory and standards compliance

- MEF CE 2.0 certified
- IEEE 802.1Q (VLAN), 802.1p (Priority), 802.1ag (CFM), 802.3ah (EFM), 802.1x
- ITU-T Y.1731, G.8010/Y.1306, G.8011.1+2, G.8032
- MEF-6.1, -9, -10.2, -11, -14, -20, -21, -22.1, -23.1, -25, -26.1, -30, -33, -35, -36
- IETF RFC 2544 (frame tests), RFC 2863 (IF-MIB), RFC 2865 (RADIUS), RFC 2819 (RMON), RFC 5357 (TWAMP)
- MEF-compliant ITU-T Y.1564 service activation testing
- ANSI C84.1-1989
- ETSI 300 132-2, BTNR2511, ETS 300-019, ETS 300-019-2-[1,2,3], ETS 300-753
- NEBS Level 3 certified
- Telcordia GR-499, GR-63-CORE, SR-332
- Safety IEC/UL/EN 60950, 21CFR1040.10, EN 60825, EN 50371, EN 300-386, EN 50160, IEC 60320/C14
- EMI EN 300-386, GR-1089-CORE, ETS 300-132, FCC Part 15, Class A, Industry Canada

Environmental

- Dimensions (W x H x D):
 - 437mm x 44mm x 220mm / 17.3" x 1.75" x 8.4"¹⁻³,
 - 443mm x 44mm x 210mm / 17.4" x 1.72" x 8.3"⁴
 - ETSI-compliant
- Operating temperature: 0 to +40°C⁴, 0 to +45°C^{1,2}, -40 to +65°C³ (hardened environment)
- Storage temperature: -40 to +70°C (GR-63-CORE)
- Humidity: 5 to 95%, B1 (non-condensing)
- Power supply unit (PSU)
 - Redundant modular PSU^{1,2,3}: 110/240 VAC, -48 to -72VDC with over-voltage and over-current protection
 - Fixed internal PSU⁴: 110/240 VAC with optional external backup PSU
- Maximum power consumption: 100 Watts
- Fanless for NID only operation⁴; hot-swappable fans for sever operation
- Dry alarm contacts^{1,2,3}