



## 210 WBX USING NUAGE NETWORKS SOFTWARE

The 210 WBX running Nuage Networks software is the industry's leading 1 RU datacenter gateway supporting software-defined networking (SDN). Built to cope with the demanding requirements of datacenters and cloud services, it perfectly fits in scale-out underlay leaf and spine CLOS fabric architectures, and serves as a powerful SDN hardware VXLAN Termination End Point (VTEP) to create Layer 2 and Layer 3 Virtual Private Network (VPN) services in the overlay.

Featuring a non-blocking architecture, the 210 WBX portfolio of next-generation leaf and spine switches offers a high density, flexible, cost-effective solution for 1GbE, 10GbE, 25GbE, 40GbE, 50GbE and 100GbE interfaces, providing universal versatility and future-ready investment protection. What's more, the 210 WBX offers high density QSFP28/QSFP+/SFP28/SFP+/SFP, supporting native 100GbE, 50GbE, 40GbE, 10GbE and 1GbE ports. Using splitter cables, it also offers the possibility of offering 4x25GbE, 2x50GbE, or 4x10GbE breakouts.

Offering Advanced SDN functionality, the 210 WBX running Nuage Networks software includes VXLAN hardware gateway support for the integration of non-virtualized compute assets into the virtualized environment in addition to other Nuage Networks features, such as access control lists (ACLs), advanced QoS, advanced forwarding rules, and more.

The Nuage Networks software feature set includes a rich IP implementation of Border Gateway Protocols/Interior Gateway Protocols (BGP/IGPs), inheriting more than a decade of Nokia Service Router Operating System (SR OS) features and networking experience. The software features initially supported are the same as those used by the Nuage Networks 7850 Virtual Services Gateway (VSG) switches.<sup>1</sup>

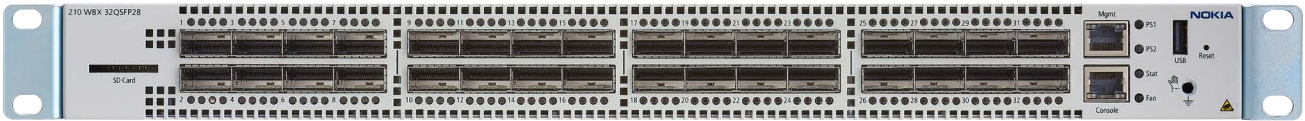
The Nuage Networks uses a powerful six-core x86 architecture CPU, extending the capabilities of the Nuage Networks SR OS. The 210 WBX runs the SR OS in a virtualized environment, using virtual machines (VMs) on top of a hypervisor running commercial Linux. That gives users the capability to install third-party or ad-hoc applications and tools on the hypervisor. Another differentiator is that the data-plane chipset and the CPU are connected, giving the hypervisor the capacity to link software applications with VPN services.

Two models of the switches using Nuage Networks are available:

- **Nuage Networks 210 WBX 32QSFP28:** A compact 1 RU platform with capacity for 32 small form-factor pluggable QSFP28 or QSFP+ ports, two redundant 800 W AC/DC power supplies, and five fan trays. This model achieves a maximum wire-speed throughput of 6.4 Tbits/s half duplex.
- **Nuage Networks 210 WBX 48SFP28 6QSFP28:** A compact 1 RU platform featuring 48 SFP ports (SFP28, SFP+ or SFP) and six QSFP28 or QSFP+ ports, two redundant 800W AC/DC power supplies, and four fan trays. This model achieves a maximum wire-speed throughput of 3.6 Tbits/s half duplex.

<sup>1</sup> Contact your Nuage Networks representative for exception details.

## 210 WBX 32QSFP28



## 210 WBX 48SFP28 6QSFP28



100GbE ports can use QSFP28/QSFP+ modules. A QSFP28 module supports 1x100GbE, 1x50GbE, or 4x25GbE, and 2x50GbE using breakout cables. A QSFP+ module supports 1x50GbE and 1x40GbE connections, or 4x10GbE connections using breakout cables.

25GbE ports can use SFP28, SFP+, or SFP modules. An SFP28 module supports 25GbE, an SFP+ module supports 10GbE, and an SFP module supports 1GbE.

All models in the 210 WBX portfolio deliver rich Layer 2 and Layer 3 features with wire-speed performance and port-to-port latency under 400 ns. Control-plane performance is achieved using a powerful 1.9GHz six core X86 architecture CPU with 16Gbytes of memory.

## Features

### Industry leading density and flexibility

The 210 WBX complements the Nuage Networks 7850 VSG (industry's highest 10GbE port density in a 1RU gateway at 96 ports) with 100GbE, 50GbE, and 25GbE capabilities. Support includes 1GbE (via SFP), 10GbE (SFP+), 25GbE (SFP28), 40GbE (QSFP+), 50GbE (QSFP+ and QSFP28) and 100GbE (QSFP28). 100GbE can be split into 4x25GbE or 2x50GbE, and 40GbE can be split into 4x10GbE.

### Proven operating system

Operating system functionality is provided with the implementation of the award winning and widely deployed SR OS from Nokia. The SR OS is implemented by the top 40 service providers worldwide and delivers a robust, scalable, and interoperable foundation proven in the world's largest IP networks.

The SR OS provides full functionality across Layers 2, 3 and 4 on the 210 WBX with support of routing IP protocols, including MP-BGP and EVPN, support of VPN services, such as a Virtual Private LAN Service or a Virtual Routing and Forwarding (VRF) network, and advanced security using ACLs and Quality of Service (QoS).

### **Operational efficiency**

The 210 WBX running Nuage Networks software supports full configuration and network management functions using SNMPv3 for the Nokia Network Services Platform (NSP) or third-party network management systems. Local configuration is provided using a console with out-of-band management provided over a dedicated Ethernet 10/100/1000 port. The 210 WBX is also integrated into the Nuage Networks Virtualized Services Assurance Platform (VSAP), which provides the network management component for the Nokia Data Center and SD-WAN (NNS) Services Delivery solutions. VSAP provides support for Nuage Networks-specific features, underlay/overlay visualization, as well as alarms/events correlation used by operations and network teams for network troubleshooting.

The 210 WBX is also integrated into the Nuage Networks VSAP, which provides the network management component for the Nokia Data Center Services Delivery solution. The solution combines functionality from the Nokia 5620 Service Aware Manager (SAM) and the Nokia 5650 Control Plane Assurance Manager (CPAM) along with unique datacenter feature sets to provide end-to-end network management and service assurance for a datacenter or Virtual Network Services (VNS) SD-WAN network.

### **Dev-Ops hypervisor**

The 210 WBX features a standard x86-64 platform hypervisor using commercial Linux to create a virtualized environment for running VMs, enabling the running of standard, off-the-shelf software from the most popular Linux repositories natively (changes in Linux kernel are not allowed). The environment gives users the capability to install third-party or ad-hoc applications and tools on the hypervisor.

Support for advanced Dev-Ops functionality is supported using dedicated 2x10-Gigabit ports that connect the x86 architecture CPU with the data plane forwarding chipset. Existing services can be added with a specific interface that refers to one of the two 10 Gigabit ports that literally exists in the service and in the hypervisor. This opens the door to true application and tools integration in the data path.

The 210 WBX offers access to the standard Linux kernel where other guest VMs can exist — in fact, the SR OS runs as a dedicated VM. The SR OS and the hypervisor use dedicated cores so there is no risk of affecting switching and routing performance when using tools, apps, or adding third-party VMs in the hypervisor.

Open for user operational requirements, the hypervisor provides the flexibility to run diagnostic and operational tools for management functions directly in the datacenter environment.

Common UNIX-based toolsets, such as Chef and Puppet, can be implemented in a secured vertical environment in the 210 WBX. External storage can be accessed using the SD card and USB port, which provides portable storage for operational toolsets and environmental configuration files.

### **ONIE**

ONIE provides the infrastructure that allows the NOS Nuage Networks 210 WBX software to be installed on a disk. NOS installation can be done from an external SD card, or from the network.<sup>2</sup>

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<sup>2</sup> For more information, please refer to the following website: <https://github.com/opencomputeproject/onie>.

### **Spine and leaf, all-in-one**

Whether the user is after an IP fabric but decides over time to use overlay networks, there is no need to change the model or trombone to a more feature-rich router. The 210 WBX using Nuage Networks software is both a spine and a leaf with level 2 and level 3 VXLAN VTEP capabilities. With its superb flexibility, the user gets to decide.

## **Benefits**

### **Forwarding table flexibility**

The forwarding table settings allow the user to configure the Layer 2 media access control (MAC) and the Layer 3 host table, enabling the 210 WBX to be optimized for different deployment scenarios (for example, when additional MACs are needed in Layer 2 services, or when more IP hosts are needed in Layer 3 services)<sup>3</sup>.

### **Multi-Chassis Link Aggregation (MCLAG)**

The 210 WBX using Nuage Networks software supports the active/active and active/standby MC-LAG protocol between two switches. This eliminates the Spanning Tree Protocol (STP) in traditional Layer 2 networks when deployed in the underlay and also in the overlay for SDN VXLAN services. Active/active MC-LAG permits complete bandwidth utilization of the links. The 210 WBX running Nuage Networks software currently supports 64 link aggregation groups with up to eight member links per group.

### **Gateway overlay functions**

Support for both fully virtualized and non-virtualized compute platforms is critical for today's datacenters. Although the trend is moving towards fully virtualized environments, there is still a high ratio of legacy applications residing on physical servers.

Overlays are used to create virtual networks across the datacenter and isolate traffic and address space between different virtual networks. At the same time, overlays keep the underlay physical network simple. More importantly, there is no need to modify the underlay when creating overlays.

The 210 WBX using Nuage Networks software supports a wire-speed hardware gateway function to bridge the non-virtualized environment seamlessly into the virtual compute environment. Gateway functionality is delivered by a robust and scalable Virtual Tunnel End Point (VTEP) implementation in hardware. This supports VLAN interconnection to the VXLAN from the non-virtualized servers for distribution to the virtual environment, using Layer 2 or Layer 3.

The 210 WBX running Nuage Networks software does not require an external controller; it has an embedded virtual service controller (VSC). The 210 WBX is integrated into the Nuage Networks Virtualized Service Directory (VSD), combining and merging services created and extended from virtualized compute nodes to bare metal servers.

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<sup>3</sup> This is part of the future roadmap.

There is also full integration with the most advanced Data Center Interconnect (DCI) routers on the market: the Nokia 7X50 family. From VSD, a service instantiated in a 210 WBX running Nuage Networks software can be automatically stretched to a Nokia 7750 Service Router. With the all-in-one-box approach, there is no need to trombone to centralized routers to offer Layer 3 overlay.<sup>4</sup>

#### Underlay services

The SR OS basic software allows the configuration of local services, such as a Virtual Private LAN Service (VPLS), Internet Enhanced Service (IES) and Virtual Private Routed Network (VPRN), in addition to overlay services.

#### High availability

High availability features of the 7950 210 WBX include hardware resiliency with redundant and hot swappable power supply units (1+1) and fan trays (4+1).

<sup>4</sup> The 210 WBX 32QSF28 can also support L3 VTEP functionality; however, this requires that certain ports be disabled.

## Detailed product features

FEATURE	BENEFIT
Layer 2 features	<ul style="list-style-type: none"> <li>■ VLAN with local port significance and VXLAN bridging and routing to Layer 2 and Layer 3 network topologies</li> <li>■ Q-in-Q</li> <li>■ 802.3ad Link Aggregation/LACP</li> <li>■ 8 ports/channel</li> <li>■ 64 groups per system</li> <li>■ Multi-Chassis Link Aggregation (MCLAG)</li> <li>■ 64 ports per MLAG</li> <li>■ 802.1AB Link Layer Discovery Protocol</li> <li>■ 802.3x Flow Control</li> <li>■ Jumbo frames (9216 bytes)</li> </ul>
Layer 3 features	<ul style="list-style-type: none"> <li>■ Routing protocols: OSPF, OSPFv3, BGP, MP-BGP, IS-IS, static, IPv4 and IPv6</li> <li>■ Equal Cost Multipath Routing (ECMP)</li> <li>■ Resilient ECMP routes</li> <li>■ VPRN (VRF)</li> <li>■ Anycast VRRP</li> </ul>
Monitoring and management	<ul style="list-style-type: none"> <li>■ Nuage Networks Virtualized Services Assurance Platform (VSAP) integration</li> <li>■ Advanced monitoring</li> <li>■ Granular port mirroring (4 destinations, any number active sessions), including VXLAN mirroring</li> <li>■ Linux tools in hypervisor with access to data plane</li> <li>■ RFC 3176 sFlow in hardware capable (future)</li> <li>■ Beacon LED for system identification</li> <li>■ SyncE in hardware capable (future)</li> <li>■ 10/100/1000 management port</li> <li>■ RS-232 serial console port</li> <li>■ USB port</li> <li>■ SNMP v1, v2, v3</li> <li>■ SSHv2</li> <li>■ Syslog</li> </ul>

FEATURE	BENEFIT
Hypervisor capabilities	<ul style="list-style-type: none"> <li>■ 6 Core, 64-bits x86 architecture: 6 core CPU (9M cache, @1.90 GHz) with VT-X, VT-d and hyper-threading</li> <li>■ Hypervisor running Linux</li> <li>■ Native KVM/QEMU support</li> <li>■ SR OS virtual machine</li> <li>■ User virtual machines</li> </ul>
Security	<ul style="list-style-type: none"> <li>■ IPv4 / IPv6 Ingress and Egress ACLs</li> <li>■ MAC ACLs</li> <li>■ TACACS+</li> <li>■ RADIUS</li> </ul>
Quality of Service	<ul style="list-style-type: none"> <li>■ Up to 16 queues per port</li> <li>■ 802.1p-based classification</li> <li>■ DSCP-based classification and remarking</li> <li>■ QoS interface trust (COS/DSCP)</li> <li>■ Strict priority queueing</li> <li>■ Weighted Round Robin (WRR) scheduling</li> <li>■ Policing/shaping</li> <li>■ Rate limiting</li> <li>■ 16M of buffering capacity</li> </ul>
SDN capabilities	<ul style="list-style-type: none"> <li>■ VXLAN routing and bridging</li> <li>■ VXLAN Tunnel Endpoint for L2 and L3</li> <li>■ Layer 2 domains</li> <li>■ Layer 3 domains</li> <li>■ ACL</li> <li>■ QoS</li> <li>■ Policy groups</li> <li>■ VXLAN domain integration with DCI</li> <li>■ Hub/spoke</li> <li>■ Domain linking</li> <li>■ FIP to gateway</li> <li>■ Static and BGP PE-CE routing</li> <li>■ Mac-move loop detection</li> <li>■ VIP</li> </ul>

Note: SDN capabilities require the Nuage Networks VSD

## Technical specifications

	210 WBX 32QSF28	210 WBX 48SF28 6QSF28
Max 100GE ports	32	6
Max 50GE ports	64	12
Max 40GE ports	32	6
Max 25GE ports	128	72
Max 10GE ports	128	72
Max 1GE ports	N/A	48
System throughput	6.4 Tb/s line rate (half duplex)	3.6 Tb/s line rate (half duplex)
CPU	1.9 GHz six core X86 CPU with 16 Gbytes	1.9 GHz six core X86 CPU with 16 Gbytes
System memory	16 Gbytes DDR4 RAM	16 Gbytes DDR4 RAM
Buffer	16 Mbytes	16 Mbytes
SSD card	8/16 Gbytes	8/16 Gbytes
Size (W x D x H)	438.5 mm x 460 mm x 43 mm	438.5 mm x 460 mm x 43 mm
Weight	12.53 kg (27.6 lb)	12.13 kg (26.7 lb)
System redundancy	1+1 PS, 4+1 FAN	1+1 PS, 3+1 FAN
Power supply	2 redundant 800 W AC (or DC) power entry modules	2 redundant 800 W AC (or DC) power entry modules
Power requirements (DC)	DC input: -48 V DC to -60 V DC	DC input: -48 V DC to -60 V DC
Minimum power consumption	139 W @ 474 BTU	132 W @ 450 BTU
Typical power consumption	349 W @ 1191 BTU	249 W @ 850 BTU
Maximum power consumption	685 W @ 2332 BTU	521 W @ 1777 BTU
Operating temperature range	0° C to 40° C (32° F to 104° F)	0° C to 40° C (32° F to 104° F)
Cooling	5 hot-swappable fan trays	4 hot-swappable fan trays