

LANCOM Solution Brief

Wired & Wireless Campus Solutions

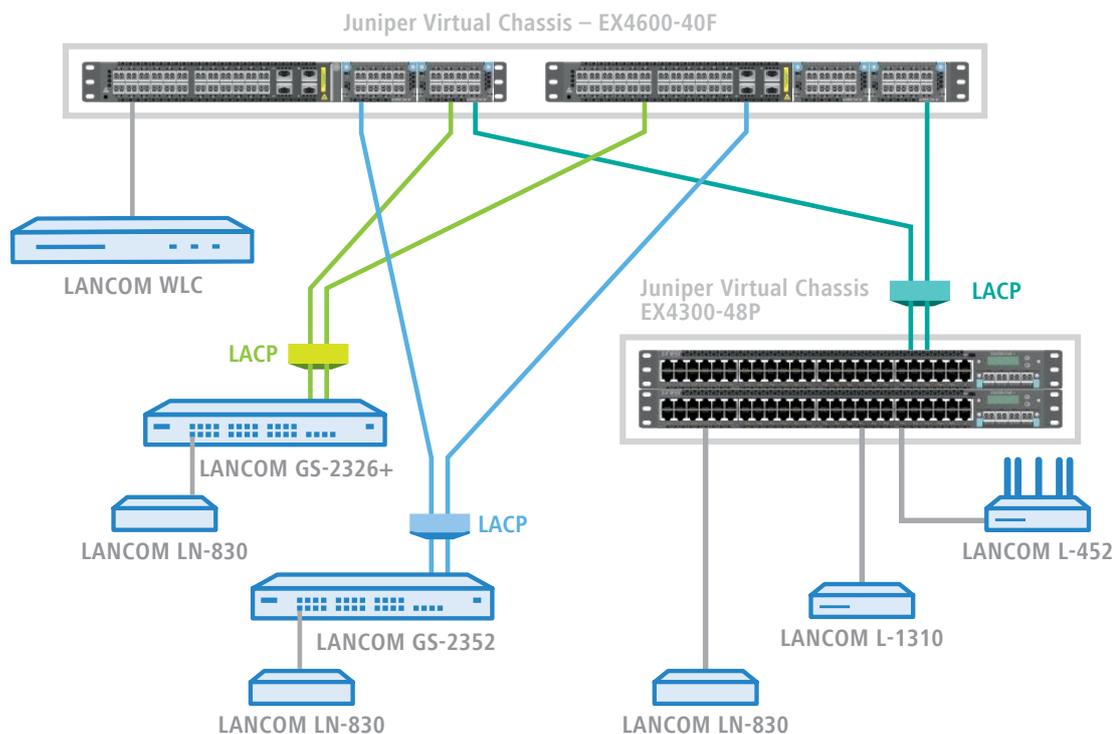
This document describes a solution for small and medium-sized campus networks. The solution has a two-stage design consisting of the campus core along with wired and wireless access. This design, which was jointly tested by Juniper and LANCOM, consists of Juniper EX-series switches and LANCOM GS switches. The WLAN is based on LANCOM WLAN controllers of the WLC series and current LANCOM access points.

Core

The core level consists of two Juniper EX4600 switches. Juniper EX switches are based on the same Junos operating system as used by the Juniper routers and firewalls operated by major providers and network operators. EX4600 switches offer high availability through redundant

and hot-swappable fans and power supply units. Each switch supports up to 72 10GE interfaces (SFP+ / SFP) and up to twelve 40GE interfaces (QSFP+).

This solution groups two EX4600 into a single Virtual Chassis in the core. The Virtual Chassis technology from Juniper ensures that the core level is highly available. The two units are managed as a single logical device with one configuration and one IP address. The two switches are redundantly connected via two 40GE connections. They can be separated by distances of up to 10 km. The Virtual Chassis can be expanded to up to 10 switches, if required. Functions such as non-stop routing and non-stop bridging ensure that the protocols stay permanently synchronized across a Virtual Chassis.



The connection to the access level uses a link aggregation group (LAG) and LACP. Because a Virtual Chassis behaves as a single logical switch, an LAG connection can terminate on either one of the two core switches. Consequently, spanning trees can be dispensed with throughout the entire network. Link aggregation minimizes the switching times in the event of an error, and ensures that both uplinks are utilized evenly.

For further information:

<http://www.juniper.net/us/en/products-services/switching/ex-series/ex4600/>

Access

The access level operates with Juniper or LANCOM switches.

Juniper access

The solution described here was tested with Juniper EX4300 switches. An alternative is to use EX3400 and EX2300 switches. The access switches can also be grouped into a Virtual Chassis with up to ten members. The Juniper Virtual Chassis technology enables the areas of access coverage to be expanded without the need of additional cabling to the core level. Also, the Virtual Chassis reduces the number of uplinks required to the core level, and it simplifies the overall management and operation.

EX4300 switches are suitable for applications that require high availability.

EX4300 switches assure high availability with their redundant, hot-swappable fans and power supply units. Depending on the variant, an EX4300 switch has either 24 or 48 access ports. It also features four 40GE interfaces that can be used to construct the Virtual Chassis, as well as an optional four SFP/SFP+-based 10GE interfaces. An LCD display enables errors and other information to be read-out directly on the device, and it allows the resetting of the device to a predefined state. The switches support PoE+ (30 watts) on all ports, making them suitable for installa-

tions with large numbers of IP phones and wireless access points. Additional access port features are 802.1X, LLDP, and LLDP-MED.

Further information:

<http://www.juniper.net/us/en/products-services/switching/ex-series/ex4300/>

LANCOM access

An alternative is to use LANCOM switches at the access level.

The LANCOM GS-series of switches offers a cost-effective option for the access level, currently varying from 8+2 Gigabit Ethernet ports (GS-2310P) to 48 Gigabit Ethernet ports with a 4x 10 Gbps (Ethernet/SFP) uplink.

This fully managed switch provides all of the popular features of a layer-2+ switch, including VLAN support, 802.1X authentication, Quality of Service, and much more. The devices are available with or without Power over Ethernet support (PoE+, 30 watt, 802.3at).

The LANCOM switches are redundantly connected to the Juniper core system via LACP. As described above, an LACP connection can be terminated on different devices of the Virtual Chassis in order to achieve failover reliability.

To this end, the devices are variously equipped depending on the model: LANCOM switch 2x SFP (GS-2310P), 4x SFP (GS-2326+/GS-2326P+) or 4x 10 Gbps SFP+ (GS-2352/GS-2352P).

The LANCOM switches accommodate SFP modules from Juniper and also directly attached DAC cables.

Alternatively, up to 4 Gigabit Ethernet ports can be grouped into an LACP bundle.

Tested variants include the LANCOM GS-2326+/LANCOM GS-2326P+, the LANCOM GS-2352 / LANCOM GS-2352P, and the LANCOM GS-2310P.

Further information on the LANCOM GS series:

<https://www.lancom-systems.com/products/network-switches/fully-managed-gigabit-switches/>

Wireless access

LANCOM WLAN controllers

Wireless access to the network is provided by components from LANCOM Systems. The wireless LAN in this example works with a WLAN controller, which is connected to the core components. The WLAN controller is optional, as the LANCOM access points can be configured separately. The controller merely facilitates the rollout and management.

WLAN controllers allow access points to be very easily rolled out across entire network infrastructures without requiring a prior configuration (zero-touch).

The access points find the controller by means of broadcasts on local networks, or by DNS resolution on routed networks. Initially the access point communicates without a VLAN tag, and for this reason the port on the switch should be an access port of the WLAN management network.

If the access point has contact to the controller and should be managed by it, the CA of the controller sends a certificate to the access point and encrypted communications are established between them. The access point then receives the relevant management information and starts operating the WLAN networks.

These can include up to 16 different WLAN networks, which the access point can then connect to the different VLANs (local breakout).

Although direct tunneling to the WLAN controller is an option, reasons of performance and redundancy make it preferable to use a local breakout into the switch infrastructure. In this case, the switch port is a member of the corresponding VLANs.

Furthermore, the controller offers a comprehensive range of optimization tools such as a client steering, which ensures that the clients are optimally distributed between

the radio modules and frequency bands.

The WLAN controller defines the properties of the WLAN networks, their assignment to any VLANs, and whether a portal for guest-network authentication is operated.

Guest-network authentication of this type can be processed directly by the WLAN controller or by a dedicated hotspot gateway.

The controller infrastructure can be designed for redundancy by using several controllers to form a cluster.

More information about LANCOM WLAN controllers:

<https://www.lancom-systems.com/products/wireless-lan/wlan-controllers/>

Access points

To provide the WLAN networks, LANCOM Systems offers a range of different access points. The various models differ primarily in the wireless standards that they support in their hardware, and the resulting properties.

The remaining functions are the same for all LANCOM access points, as the LANCOM operating system LCOS is operated by all of these devices. All of the software-based functionality is available to an equal extent in all of the access points, as long as this is supported by the device hardware.

LANCOM offers different series of access points. The spectrum ranges from an entry-level model with 2.4-GHz single-stream IEEE 802.11n and a limited range of features to the IEEE 802.11ac Wave 2 access point featuring dual-radio 2.4/5 GHz and 4x4 MIMO. This portfolio is rounded off by specialized devices with dust-resistant enclosures for operation in harsh environments, as well as outdoor devices with an extended temperature range for direct coverage in the open air. Also available are a range of external antennas and other accessories.

Further information and a complete overview of the LANCOS WLAN portfolio is available here:

<https://www.lancom-systems.com/products/wireless-lan/>

Summary

The solution presented here describes a verified design for campus networks with wired and wireless access. The network is based on a two-stage design.

- > The core level uses redundant Juniper EX switches.
- > Depending on the operating requirements, the access level consists of Juniper or LANCOS access switches in combination with LANCOS wireless LAN devices.

Contact

If you have further questions, please contact us at the e-mail address sales@lancom.eu.