2G6-FA

Modular Optical Platform for HFC and FTTH Networks

KATHREIN

Digital Systems GmbH

KATHREIN | Digital Systems GmbH

Who we are and **what** we stand for

We ensure the best possible radio and TV reception

With decades of experience, Kathrein Digital Systems is an innovation and technology driver in the field of satellite reception. Our comprehensive portfolio ranges from antennas and components for signal processing to extensive installation accessories and high quality measuring instruments.

Thanks to extensive know-how in development and unsurpassed quality standards in production, our solutions and systems are absolutely top class. High-quality satellite reception systems in conjunction with sophisticated solutions for signal distribution, whether in single-family homes or in large building complexes, bring the signals to the receiving equipment in best HD quality.

New technologies such as SAT>IP, optical SAT distribution or modular headend technology for hotel TVs are closing the gap between traditional signal distribution and modern optical fibre and network technology.

Kathrein Digital System's advanced solutions are also the best choice for mobile TV reception in caravans and mobile homes.

Find out more about us at **www.kathrein-ds.com**

Our awards in 2019:

Overview

The 2G6-FA product series provides a modular platform for analog optical transmission in state-of the-art Hybrid Fiber Coax (HFC), Fiber to the Home (FTTH) and RF over Glass (RFoG) networks. It offers outstanding performance and high port density combined with a cost efficient and reliable design.

The platform enables a variety of applications:

- CATV-distribution over HFC networks including Targeted Services (high speed internet/voice over IP services and video on demand)
- Multiwave 1550 nm (C-band) and 1310 nm (O-band) DWDM transmission of CATV signals to be used in fiber node segmentation
- RF video overlay (CATV & SAT TV) in FTTH networks
- Access networks realized with RFoG technology

DOCSIS 3.1-Ready

We are continuously enhancing our products, so that upcoming technical changes in HFC technology are always accommodated in time. In line with this approach 2G6 has been successfully transformed to a product series satisfying the requirements of the latest DOCSIS-standard: All transmitters and receivers are upgraded in forward path to a RF frequency of 1218 MHz and in return path to 204 MHz complying with DOCSIS 3.1.

Optical Platform

- Modules ranging from optical transmitters, optical amplifiers, optical receivers, optical switches, and element controller
- Forward transmission 47 (70)–1218 / 2800 MHz
- Return transmission 5–204 MHz, extendable to 450 MHz
- SNMP and Web browser based management
- Optical connectors: SC/APC, LC/APC, E2000
- RF connectors: F female
- 16 modules per subrack, 4 RU height
- Operation environmental conditions according ETS 300 019-1-3, class 3.1 (temperature controlled locations)

Modules

Optical Transmitters

The optical transmitter product series consists of three distinct transmitter families for the entire application range in HFC and FTTH networks:

- 1550 nm Broadcast transmitters
- DWDM Full Band transmitters
- DWDM Narrowcast transmitters

They are covering the complete range from direct modulated standard up to high end external modulated transmitters, from 1310 nm up to O-band and C-Band wavelengths. Various models are available with a broad selection of output power levels, a wide range of channels on the standard DWDM ITU grid. All featureing 1218 MHz bandwidth.

Optical Amplifier (EDFA)

Optical amplifiers are availables for two different applications:

- EDFA: Recovery of optical signal level after transmission over long fiber distances (inline amplifier)
- YEDFA: Boosting optical signal level for the final distribution to a large number of end users.

We offer amplifiers with up to 16 output ports and power level up to 20 dBm.

Optical Receiver

- Low noise optical receivers for forward path signals as well as quad port optical receiver modules for the return path with 1218 MHz / 204 MHz bandwidth
- Ultra-low noise receivers for RFoG applications

Optical Switch

Redundancy switching between two optical inputs or outputs

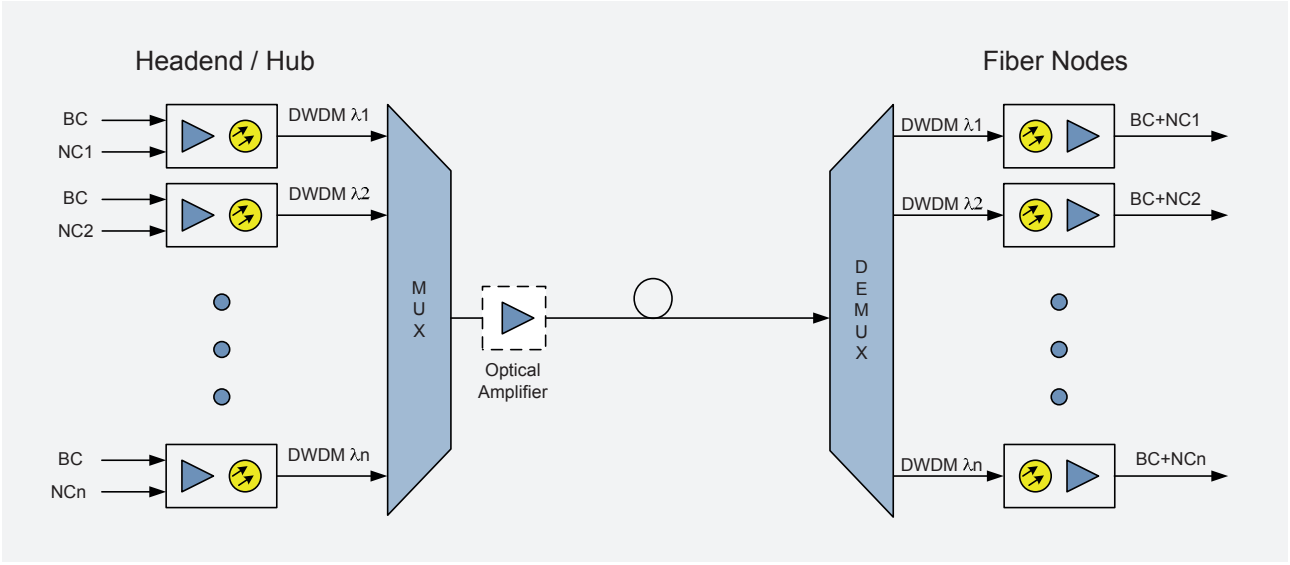
Element Controller

- Ethernet interface, SNMP and Web, HMS compatible
- A single controller manages up to 60 modules

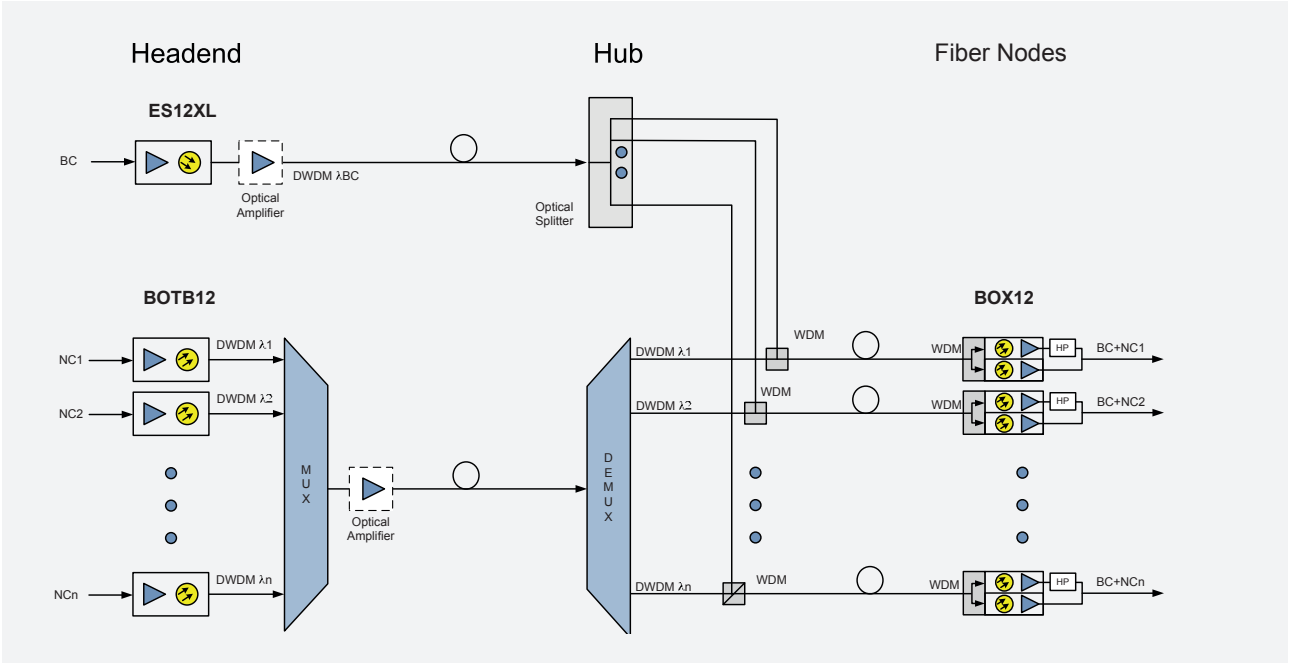
HFC Transmission Applications

Typical Applications

Full RF band Multiwave Transmission in Fiber Node Segmentation



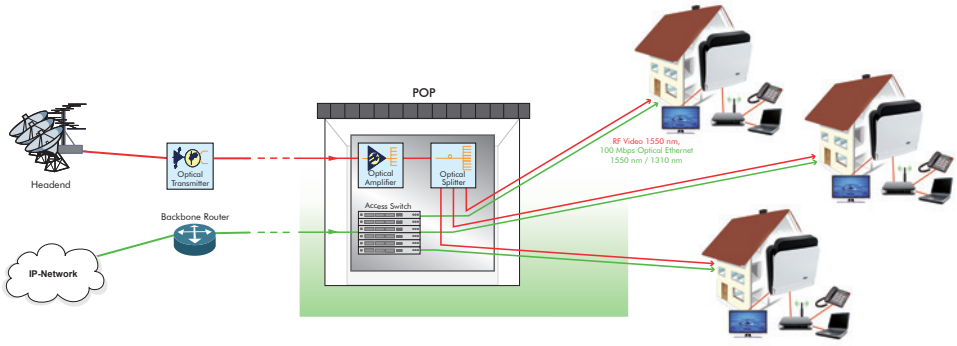
Broadcast/Narrowcast RF Split Band in High Performance HFC trunking Networks



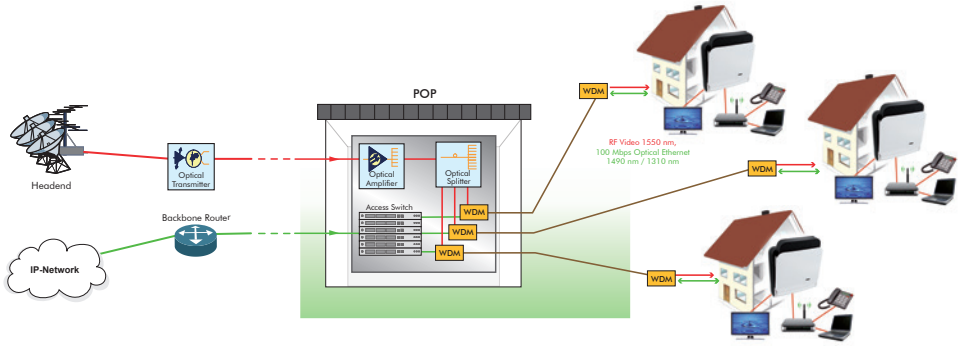
FTTH Network Applications

RF Video Overlay: CATV & SAT TV Distribution over Fiber to the Home Networks

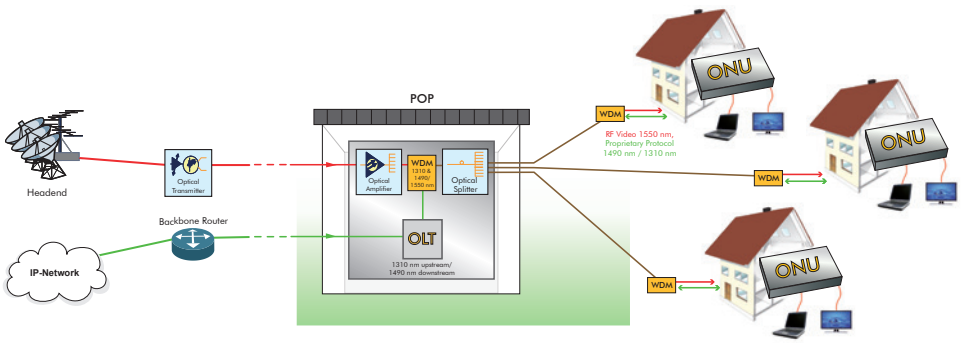
Ethernet Point-to-Point Topology (EPTP) Two-Fiber-Solution



Ethernet Point-to-Point Topology (EPTP) One-Fiber-Solution



PON and RF Video Overlay



Broadcast Transmitters

External Modulated 1550 nm Optical CATV Transmitter
ET12XL

Electrical to optical conversion of multichannel CATV signals e.g. AM-VSB, FM and QAM signals in large scale HFC and FTTH networks

Features

- High performance Broadcast CATV transmitter
- Low phase noise, narrow linewidth CW-DFB laser
- $LiNb0_3$ modulator incorporating intensity and phase modulator
- C-Band DWDM wavelength according to ITU grid
- Wavelength adjustable +/- 100 GHz
- Bandwidth 47–1218 MHz
- Two optical outputs with +8.5 dBm output power each (+10.0 dBm output power option available upon request)
- Adjustable SBS threshold up to 19 dBm
- Enables usage of optical amplifiers (EDFAs, YEDFAs) as boosters or repeaters
- Excellent performance in optical point-to multipoint links exceeding 100 km

External Modulated 1550 nm Optical CATV and SAT-IF Transmitter
ET28XL-xxxxxx

Electrical to optical conversion of multichannel CATV signals e.g. AM-VSB, FM and QAM signals & additional SAT-IF signals for RF Video Overlay in large scale FTTH networks

Features

- High performance Broadcast CATV&SAT TV transmitter
- Low phase noise, narrow linewidth cw-DFB laser
- LiNb03 modulator incorporating intensity and phase modulator
- C-Band DWDM wavelength according to ITU grid
- Wavelength adjustable +/- 100 GHz
- Bandwidth 47–870 MHz (CATV) & 950–2800 MHz (SAT-IF)
- Two optical outputs with +8.5 dBm output power each (+10.0 dBm output power option available upon request)
- Adjustable SBS threshold up to 19 dBm
- Enables usage of optical amplifiers (EDFAs, YEDFAs) as boosters or repeaters
- Excellent performance in optical point-to multipoint links exceeding 40 km

Full Band DWDM Transmitters

Direct Modulated Transmitter

OTC12xxxxxx / OTC12Nxxxxxx

Electrical to optical conversion of multichannel CATV signals e.g. AM-VSB, FM and QAM signals in HFC networks

Features

- Full Band CATV transmitter
- Cost efficient low phase noise, narrow linewidth DFB laser
- Multiple wavelength options:
  1310 nm, O-band DWDM, C-band DWDM according to ITU grid
- Optical output power: +8.0 to +13.0 dBm
- Predistortion technology
- Pre-chirping technology for chromatic dispersion compensation
- Bandwidth 80–1218 MHz
- High quality transmission in point-to-point links up to 25 km
- Dual RF inputs: low and high level input
- Available as narrowcast input with (OTC12Nxxxxxx) or without (OTC12Nxxxxxx) high isolation

Dual Direct Modulated Transmitter

OTC212Nxxxxxx

Electrical to optical conversion of multichannel CATV signals e.g. AM-VSB, FM and QAM signals in HFC networks

Features

- Dual Full Band CATV transmitter
- Cost efficient low phase noise, narrow linewidth DFB laser
- Multiple wavelength options:
  1310 nm, O-band DWDM, C-band DWDM according to ITU grid
- Optical output power: +8.0 to +13.0 dBm
- Predistortion technology
- Pre-chirping technology for chromatic dispersion compensation
- Bandwidth 5–1218 MHz
- High quality transmission in point-to-point links up to 25 km
- Two individual Narrowcast inputs, one common Broadcast input and one testpoint

Optical Amplifiers

Standard Optical Amplifier
OAxxxx-FA

Application
- Amplification of 1550 nm optical signals on single mode fibers
- Booster, in-line or distribution amplifier in HFC networks

Features
- Erbium doped fiber amplifier (EDFA)
- +17.0 dBm optical output power per port (+13.0 to +25.0 dBm output power options available upon request)
- 1–4 optical output ports (internal optical splitter)
- Up to 8 optical output ports available upon request
- Input signal wavelength 1540–1560 nm
- Constant output power control or constant gain control
- Optional measurement unit for SBS threshold of succeeding fiberoptic links (SBS detection)

Gain-Flattened Optical Amplifier
OAxxxxGFFxx-FA and OAxxxxGFF-FA

Application
- Amplification of optical DWDM signals on single mode fibers (1530–1561 nm)
- In-line amplifier in HFC networks

Features
- Erbium doped fiber amplifier (EDFA)
- Fixed gain and variable gain versions
- +16.5 dBm optical output power per port (+13.0 to +20.0 dBm output power options available upon request)
- 1 optical output ports (internal optical splitter)
- Up to 2 optical output ports available upon request
- Input signal wavelength 1530–1561 nm
- Constant output power control or constant gain control
- Optional measurement unit for SBS threshold of succeeding fiberoptic wlinks (SBS detection)
- Fixed gain with nominal gain optimization for 10 dB
- Fixed gain with nominal gain optimization for +15.0, +20.0 and +25.0 dB available upon request
- Variable gain version with adjustable gain +5.0 to+20.0 dB available upon request
- Gain flatness @ nominal gain ± 1dB

High Power Optical Amplifier

OAxxxxxx-FA

Application

- Amplification of 1550 nm optical signals on single mode fibers
- Booster, in-line or distribution amplifier in HFC and FTTH networks

Features

- Cladding pumped Ytterbium / Erbium doped fiber amplifier (YEDFA)
- +20.0 dBm optical output power per port (+16.5 to +21.0 dBm output power options available upon request)
- 4 optical output ports (internal optical splitter)
- Up to 16 optical output ports available upon request
- Input signal wavelength 1545–1565 nm
- Optical preamplifier (EDFA) included
- Broad optical input power range: +5 dBm to +10 dBm
- Constant output power control

Optical Receivers

Optical Receiver
OR12-FA

Optical to electrical conversion of Broadcast signals in HFC networks

Features
- Broadcast Receiver with two RF output ports
- Design for extremely low noise and low intermodulations
- Optical input power ranges from -8 dBm up to +4 dBm
- Bandwidth 85–1218 MHz
- Automatic RF output level control using optical input level

In order to realize highest port density we offer quadruple optical return path receivers with front side access for optical ports and rear side access for RF Ports.

Quad Optical Return Channel Receiver
OR43-300-FA

Optical to electrical conversion of Return Channel signals in HFC networks

Features
- Quad Return Channel Receiver: Four independent optical receivers
- Wide optical input power range: -16 to +2 dBm
- Bandwidth 5–204 MHz
- Each of the 4 receivers can be switched to the -20dB test port on front
- Pilot tone controlled or optical input power controlled AGC mode to keep the RF level independent of the optical input power

Quad Optical RFoG Return Channel Receiver
OR43-204-FA

Optical to electrical conversion of Return Channel signals in RFoG and HFC networks

Features

- Quad Return Channel Receiver:
  Four independent optical receivers
- Wide optical input power range: -25 to -10 dBm
- Bandwidth 5–204 MHz
- 28 dB optical budget in systems with RFoG nodes due to ultra low noise optical receiver technology
- RF combination output 4:1
- Optical power level detection with LED indication for all inputs suitable for pulsed optical RFoG (TDMA) signals or continuous wave detection (HFC mode)

Accessory Modules

Optical Switch
OS212-FA

Redundancy switching between two optical input signals in case of missing or insufficient optical power

Features

- 1:2 Optical Switch
- Nominal input power: -25 to +23 dBm
- Wavelength range: 1280-1340 nm; 1520-1625 nm
- Independent optical power control of both inputs
- Sensor and LED signalling for the switch position
- Automatic, remote and manual operation

Element Controller (Ethernet)
ECE-FA

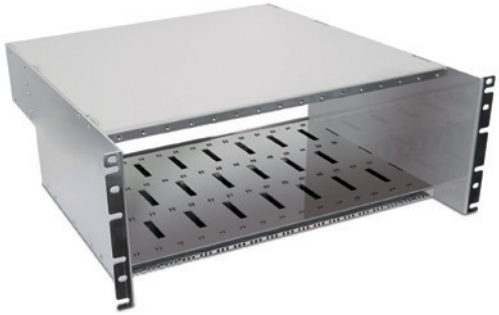
2G6 device remote supervision and controlling

Features

- Automatically detecting and polling of all active 2G6 series modules connected to the serial RS485 bus for remote supervision and control
- Webserver/Ethernet management for easy local and remote management
- SNMP/Ethernet management to connect to Network Management Systems
- Easy software updates via Ethernet interface
- High secure network access using HTTPS and SNMPv3
- Four SFP standard cages for 1GbE SFP transceivers
- IPv6 support
- Eight-port Ethernet layer 2 switch
- Wirespeed switching interface
- Web interface GUI for mobile devices

2G6 Platform

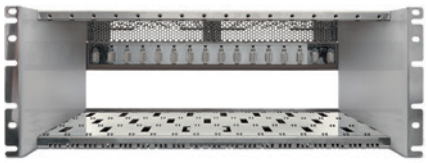
2G6 Module Chassis
SR19 (48 V)/ SR19-E (230 V)



Chassis for installation, powering and cooling of 2G6-modules

Features

- 19 inch / 4 RU chassis, adaptable to metric (ETSI) racks
- Available with standard brackets for regular mounting (SR19) and extended brackets for 5 cm reverse offset mounting (SR19-E)
- Up to 16 modules pluggable on front, together with up to two power supply and fan units mounted on the rear
- Dust safe cooling (no dust blows through the electronics of the modules)
- Redundancy option for power supply and fan unit (2 units hot pluggable),
- Automatic slot and chassis address detection of plugged modules
- Several chassis can be controlled by one ECE element controller unit
- Real time hot standby for module slots next to each other (slot 1-2, 3-4 ... 15-16)
- Maximum capacity:
  - 32 Optical transmitters (Dual transmitter in 1 slot)
  - 16 Optical amplifiers (1 slot)
  - 64 Return Channel receivers (Quad Receiver in 1 slot)

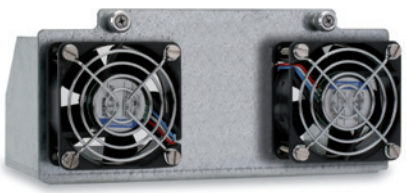


Chassis Power Modules
PMAC / PMDC

Power Supply and Fan Unit for 2G6 chassis

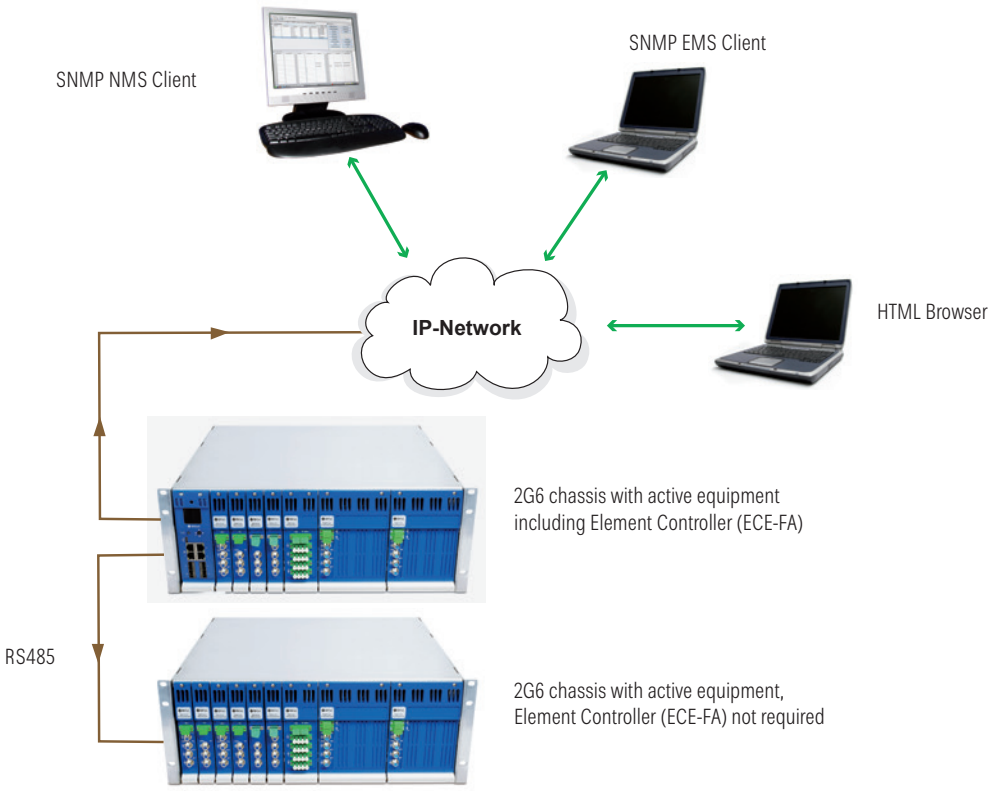
Features

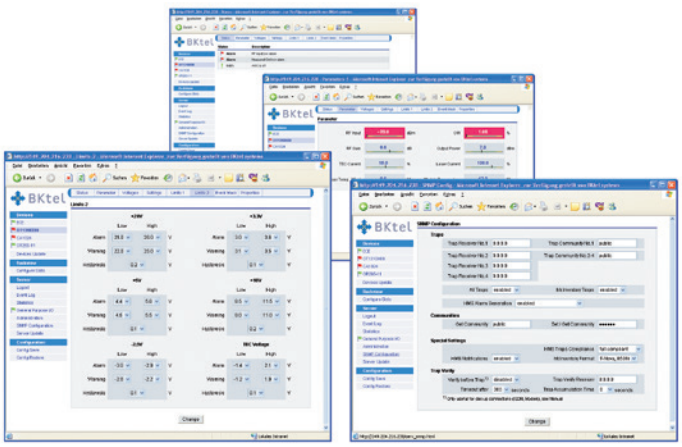
- 90–264 VAC or 36–60 VDC powering
- Redundancy option for power supply and fan unit (2 units hot pluggable)
- Available in 90-264 VAC (PMAC) or 36-60 VDC (PMDC) powering option



Network Management

For monitoring, control and configuration of the active equipment, the ECE-FA controller is available. The ECE-FA is equipped with an embedded Web-Server, accessible by standardized security procedures via an Ethernet interface from any Web-Browser. The remote SNMP interface allows controlling and monitoring of all active components and provides the interface to a higher level Umbrella Management System, such as the CABLEwatch EMS. One ECE-FA can manage modules in multiple chassis.





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