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2G6

HFC Transmission Platform

Overview
With 2G6, the BKtel team has developed a leading edge HFC platform with premium performance and outstanding reliability meeting cost efficiency.

The 2G6 is designed to meet all demands of future-safe optical broadband networks. Regardless of technology or requirements, the 2G6 platform is the right choice for small, medium and large scale operators.

With its modular concept and high density, the 2G6 supports all kinds of applications, like e.g.:

- CATV distribution and high speed Internet/VoIP over HFC Network
- Fiber To The Home with overlay CATV distribution
- HFC network enhanced for interactive Services like Video on Demand
- SAT IF Transport Network

The robustness, form factor and modularity of the 2G6 platform reach a new dimension in optical transport for broadband networks.

Optical Platform
- Forward transmission 47...860/2605 MHz
- Reverse transmission 5...65 MHz
- HMS (hybrid management system) compliant, SNMP and Web browser based system management
- Optical connectors: SC/APC, E2000, etc
- RF connectors: F
- Operation environmental conditions according ETS 300 019-1-3, class 3.1 (temperature controlled locations)

Optical Transmitter Family
Directly modulated transmitters are available for 1310 nm or 1550 nm applications:
- Forward transmitter with various output powers (optional SAT IF input)
- DWDM narrowcast transmitter
- Reverse transmitters 1310 nm, 1550 nm or CWDM
- Externally modulated 1550 nm transmitter

Optical Amplifier Family
Erbium doped fiber amplifiers with output variants such as 1 x 13 dBm, 8 x 13 dBm or 1 x 23 dBm for perfect flexibility in the optical transmission network section.

Optical Receiver Family
Low noise optical receivers for forward path signals as well as dual/quad port optical receiver modules for the reverse path.

Element Controller
Element management controller with Ethernet interface, SNMP and Web Server manages up to three 2G6 chassis.
Applications

CATV distribution and high speed Internet/VoIP over HFC Network

1310 nm Distribution Network with Return Path

CATV distribution and high speed Internet/VoIP over long distance HFC Network

1550 nm Distribution Network with Return Path
CATV distribution over Fiber To The Home Networks

Passive Optical Network with RF Overlay
HFC network for interactive Services like Video on Demand

1550 nm Distribution Network and DWDM, Narrowcast and CWDM Return Path
SAT IF Transport Network
CWDM Distribution Network for L-Band Frequencies

Ultra long haul CATV Distribution
1550 nm with Dispersion Compensation/1310 nm Distribution
Fiber To The Home Point-to-Point

Point-to-Point Ethernet with RF-Overlay

Fiber Node

DCM

OA

Splitter

0 ... 20 km

0 ... 30 km

0 ... 50 km

Fiber Node
2G6 Platform

Chassis - SR19

Features

- 19” 4 HU modular design (ETSI available)
- Highest density:
  16 slots for plug-in Modules
- High quality stainless steel housing
- Redundant powering on the rear (fan cooling, in-service maintenance)
- Dust-safe air flow
- Rear cabling of optical and coaxial lines, test ports on the front panel
- LCD display on the front side for local setup and monitoring
- Status indication per module (green: OK, orange: Warning, red: Alarm)
Power Supply and Fan Unit

Features
- 110…240 VAC or 48/60 VDC powering
- Redundancy option for power supply and fan unit (2 units hot pluggable)

Front Panel

Features
- Local configuration and status check through pluggable front panel with LC display and keys
- Additional status indication on front panel through LEDs
2G6 Modules

Direct Modulated Optical Transmitter – OTyyyyZnn

Applications & Options
- 1310nm forward path transmitter OT1310X with high linearity
- 1310nm forward path transmitter OT1310N with standard linearity
- 1550nm forward path transmitter OT1550X for EDFA applications
- DWDM narrowcast transmitter OTDWnnL with ITU grid wavelength
- CWDM reverse path transmitter OTCWnnS with ITU grid wavelength
- Automatic gain adjustment (0...24dB) and OMI control
- Dual inputs (Broadcast/Narrowcast)

Types

<table>
<thead>
<tr>
<th></th>
<th>OT1310Xnn / Nnn</th>
<th>OT1550Xnn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelength</td>
<td>1310 nm</td>
<td>1550nm</td>
</tr>
<tr>
<td>Optical output power</td>
<td>3 ... 14 dBm</td>
<td>8 ±1 dBm</td>
</tr>
<tr>
<td>Frequency range</td>
<td>5 ... 1000 MHz</td>
<td>5 ... 1000 MHz</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>OTDWmLnn</th>
<th>OTCWmSnn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelength</td>
<td>ITU grid m</td>
<td>ITU grid m</td>
</tr>
<tr>
<td>Optical output power</td>
<td>8dBm, 11dBm</td>
<td>3dBm, 6dBm</td>
</tr>
<tr>
<td>Frequency range</td>
<td>5 ... 1000 MHz</td>
<td>5 ... 450 MHz</td>
</tr>
</tbody>
</table>

CATV & SAT IF Optical Transmitter – OTSyyyyXnn

Applications & Options
- Combined CATV forward path and SAT-IF Optical Transmitter for ultra broadband applications
- Separate input ports for CATV (5 ... 860 MHz) and SAT-IF (950 ... 2150 MHz)

Types

<table>
<thead>
<tr>
<th></th>
<th>OTS1310Xnn</th>
<th>OTS1550Xnn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelength</td>
<td>1310 nm</td>
<td>1550nm</td>
</tr>
<tr>
<td>Optical output power</td>
<td>5, 8, 11, 13 dBm</td>
<td>8 ±1 dBm</td>
</tr>
</tbody>
</table>
Dual SAT IF Optical Transmitter – OT226-x

Applications & Options
- L Band (SAT IF) optical transmitter
- Two independent optical transmitter blocks per module
- Optional CWDM multiplex
- LNB feed
- RF slope and gain control

1310 nm Types

<table>
<thead>
<tr>
<th>OT226-1310-n</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelengths</td>
<td>1310 nm</td>
</tr>
<tr>
<td>Number of inputs</td>
<td>2</td>
</tr>
<tr>
<td>Optical output power range</td>
<td>3 dBm, 6 dBm</td>
</tr>
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</table>

CWDM Types

<table>
<thead>
<tr>
<th>OT226-C11-n-C12-n</th>
<th>...</th>
<th>OT226-C17-n-C18-n</th>
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</thead>
<tbody>
<tr>
<td>Wavelengths</td>
<td>1470 nm, 1490 nm</td>
<td>1590 nm, 1610 nm</td>
</tr>
<tr>
<td>Optical output power range</td>
<td>3 dBm, 6 dBm</td>
<td>3 dBm, 6 dBm</td>
</tr>
</tbody>
</table>

Optical Amplifier OAnxxx

Applications & Options
- Erbium doped optical fiber amplifier EDFA for 1550nm CATV networks
- DWDM narrowcast signal amplification

Types

<table>
<thead>
<tr>
<th>OTAn130</th>
<th>OTAn160</th>
<th>OTAn200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical output power</td>
<td>13 dBm</td>
<td>16 dBm</td>
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<tr>
<td>Number n of ports</td>
<td>1, 2, 4, 8</td>
<td>1, 2, 4</td>
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</tbody>
</table>
Optical Booster Amplifier OBAnnxxx-y

Applications & Options
- Cladding-pumped ErYb doped optical fiber amplifier (EYDFA) for FTtx/PON networks
- RF video overlay networks
- Less space consuming due to integrated optical preamplifier
- Optionally with integrated WDM filter (-a)

Types

<table>
<thead>
<tr>
<th></th>
<th>OBA16165</th>
<th>OBAnn200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical output power</td>
<td>16,5 dBm</td>
<td>20 dBm</td>
</tr>
<tr>
<td>Number (n) of ports</td>
<td>16</td>
<td>8, 16</td>
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<tr>
<td>Integrated WDM filter</td>
<td>-</td>
<td>-</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>OBA16165-a</th>
<th>OBAnn200-a</th>
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<tbody>
<tr>
<td>Optical output power</td>
<td>16,5 dBm</td>
<td>20 dBm</td>
</tr>
<tr>
<td>Number (n) of ports</td>
<td>16</td>
<td>8, 16</td>
</tr>
<tr>
<td>Integrated WDM filter</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Optical Forward Path Receiver OR900

Applications & Options
- Advanced very low noise optical receiver for 1310nm/1550nm CATV networks
- Forward broadcast and narrowcast optical receiver
- Redundancy option
- Built-in AGC control keeps RF output level constant
- RF test port on front panel

Types

<table>
<thead>
<tr>
<th></th>
<th>OR900</th>
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</thead>
<tbody>
<tr>
<td>Optical input level</td>
<td>-10 dBm ... +4 dBm</td>
</tr>
<tr>
<td>Optical wavelength</td>
<td>1280 nm ... 1610 nm</td>
</tr>
<tr>
<td>RF bandwidth</td>
<td>47 MHz ... 870 MHz</td>
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</tbody>
</table>
**Broadband RF Amplifier CA1024**

**Applications & Options**
- RF amplification of both, forward and reverse path CATV signals
- Redundancy option
- RF-gain/slope and AGC configurable via software
- RF power detection
- Second input for local insertion of RF-signals
- Test port on front panel

**Types**

<table>
<thead>
<tr>
<th></th>
<th>CA1024</th>
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</thead>
<tbody>
<tr>
<td>Frequency range</td>
<td>5 ... 1000 MHz</td>
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<tr>
<td>Gain range</td>
<td>0 ... 24 dB</td>
</tr>
<tr>
<td>Slope range</td>
<td>0 ... 16 dB</td>
</tr>
<tr>
<td>Noise figure</td>
<td>typ. 6.5 dB</td>
</tr>
</tbody>
</table>

**Dual/Quad Optical Reverse Path Receiver OR2160 / OR4160**

**Applications & Options**
- Optical Reverse Receiver for CATV networks
- 2 or 4 independent optical receiver blocks per module
- Redundancy option
- Each of the 2/4 independent optical receivers can be switched to the Test Port on the front test port
- Full performance monitoring

**Types**

<table>
<thead>
<tr>
<th></th>
<th>OR2160</th>
<th>OR4160</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receivers per module</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Optical input range</td>
<td>typ. -16 ... +2 dBm</td>
<td>typ. -16 ... +2 dBm</td>
</tr>
</tbody>
</table>
Passive Optics

Applications & Options
- Optical dual window splitting / combining
- Optical MUX / DEMUX filtering
- Optical Taps
- Dispersion Compensator Modules

Element Controller (Ethernet) ECE

Applications & Options
- Automatically detecting and polling of all 2G6 series modules connected to the serial RS485 bus for remote supervision and control
- Interface to front panel of 2G6 Chassis
- Webserver/Ethernet management for easy local and remote management
- SNMP/Ethernet management to connect to Network Management Systems
- Easy software updates via Ethernet interface
Network Management

Overview
For simplicity of monitoring, control and configuration, the 2G6 Element Controller (ECE) comes complete with an Embedded Web-Server, accessible by standardized security procedures 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 Bktel CABLEwatch EMS.
Our aim is the manufacture of technically leading products to the advantage of our customers. The term “engineering based” defines exactly BKtel’s orientation: Our organisation serves solely to optimally support the creativity and flexibility of product and system development.

BKtel has enforced this philosophy consequently throughout the formation of the company and in day-to-day work. All tasks that do not directly serve research and development or the implementation of the products are carried out by third parties as services. As a result the organisation has a lean and efficient structure.

This organisation, with a strict “production to order” philosophy, is able to manufacture products, which not only offer our customers technically forward-looking solutions but also economical communication solutions.

Our Aim
Innovative services such as fast internet, “Voice over IP” and modern cable TV revolutionise everyday life, inspire the telecommunication industry and determine the future of the telecommunication market. BKtel supplies today its worldwide customer base with system solutions which they require in order to create and operate interactive networks successfully. The core of our business is the development, in accordance with market requirements, of technically leading components and systems, high standard manufacturing and reliable delivery.

Outlook
Innovative broadband networks will offer worldwide a sole platform for the fast and economical data, voice and cable TV services. BKtel in close cooperation with its customers will deliver systems and relevant network management, which will play a key role in the formation of these broadband networks. As a reliable partner our company will help design these networks.

Dr.-Ing. Jürgen Seidenberg
General Manager
BKtel communications GmbH

Dipl.-Ing. Klaus Gosger
General Manager
BKtel systems GmbH & Co. KG

As a result of a management buy-out from Alcatel and Thomson Multimedia, BKtel has references worldwide. To date over 20 million homes passed have been realised with the use of systems from BKtel. Involved are many different networks from small coax networks to large multimedia networks which include network management. Among our customers are network operators of every size as well as system integrators and OEM distributors.
Experts in Optical Networks

BKtel Group
Development, manufacturing, integration and marketing of systems and components for optical networks

System Solutions
- Broadband communication
- Manageable HFC networks
- German "BK" HFC networks
- DWDM solutions
- Fiber-To-The-Home networks

Products
- External modulated 1550 nm transmitters
- Direct modulated 1310/1550 nm transmitters
- Optical amplifiers
- Optical return channel systems
- Optical receivers
- Passive optical components
- DWDM technology for down- and upstream
- Ethernet media converters
- FTTH optical network units

Services
- Training
- Planning
- Installation and operation
- Approval and certification

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