Utility Communications
Microwave Radio Communication
The Digital Radio Family
Digital radio systems for a wide range of applications

A radio link system solves communication problems in areas with low infrastructure or difficult terrain and where a rapid network deployment is needed.

Every day power utilities, oil and gas and water authorities, highway, railway and renewable energy companies need to guarantee to the users two main goals: availability of energy and services provision.

Our mission is to support all customers to reach these goals designing and implementing for them a communication network that can respond easily to their needs.

With our long experience in communications networks based on countless projects, we can design and deploy together with the customers the best communication solutions to guarantee the best network management, supervision and protection systems.

Point-to-point radio is often the only solution in difficult topographies and in many densely populated areas. Our wide range of systems enables us to find the optimum link for every communication problem.

It is also largely employed in both access networks and backbone provisioning, being a competitive alternative or complement to optical fibre networks, where a cost-effective solution and a rapid network deployment are a “must” for the user.

Microwave radio communications equipment is flexible to fit customer’s needs in every circumstance

- 10/100/1000 Ethernet connections
- WiMAX backhauling
- Private data networks (WANs, LANs, etc.)
- Back-up transmission medium to fibre optic links
- Spur links for radio or fibre optic backbones/rings
- Last mile fibre extension
- Leased lines replacement
- High capacity SDH/IP radio ring or backbone up to 4 x STM-1 or 800 Mbit/s
- High capacity broadband access networks

Standard features

- Fully programmable
- Excellent electrical performance
- Compact indoor unit size, frequency independent (modular or monolithic version)
- Outdoor unit easy to handle, install, and redeploy (integrated mounting on the rear of antenna up to 1.2 m diameter)
- Universal outdoor unit for PDH/SDH/Ethernet traffic
- Wide range of frequency bands
- Wide range of transmission capacity and modulation schemes:
  - Scalable data rate from 8 to 400 Mbps in 1 RU unit
  - Modulation schemes from 4 to 256 QAM
- Hitless switch-over for 1+1 systems
- NEW adaptive code modulation feature (automatic selec-
Optional features
- Co-channel operation to double the radio capacity in the same bandwidth (from 400 to 800 Mbps in 56 MHz bandwidth)
- Service channels with collective or selective calling
- VoIP telephone service is available
- Network management system

Construction
- 19" mechanical arrangement
- For frequency ranges 7 GHz and higher, indoor/outdoor versions are available

Microwave radio — an advantageous option in difficult terrain and for rapid network deployment. Our microwave radio product range includes digital transmission equipment for a wide range of frequency bands and data transmission rates for PDH/SDH/Ethernet techniques.

By judiciously applying microwave and optical links, ABB can engineer the optimum communications network topology for you.
PDH radio family (ALS-PDH)

Main features
- Full software capacity and modulation selection
- Fast installation and commissioning
- Easy configuration upgrade
- Built in ATPC
- Mixed TDM and ethernet interfaces
- Extended environmental compatibility
- Low cost O&M (high reliability and fast restoring of replaceable units)
- Integrated G.821/G.826/G.828 performance monitoring
- Alarm history log, etc.
- Full availability of O&M tools (loop backs, switch manual forcing, etc.)

PDH point-to-point licensed digital radio (ALS-PDH series)

<table>
<thead>
<tr>
<th>Frequency band (GHz)</th>
<th>Product: Universal ODU</th>
<th>Product: AL ODU</th>
<th>Transmission capacity (Mbit/s)</th>
<th>All indoor</th>
<th>Split mount</th>
</tr>
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<tbody>
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<td>1.9 - 2.7</td>
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<td>ASN42</td>
<td></td>
<td>●</td>
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</table>
Main features

- A lightweight, compact, weatherproof IP65 box contains both transceiver and baseband unit
- Allows simultaneous transmission of Ethernet and PDH traffic over the same radio link
- Embedded Ethernet switch with VLAN management
- Tributary interfaces: E1 and Ethernet
  - Ethernet throughput range: 4 Mbit/s -> 100 Mbit/s
  - PDH capacity: 1 x E1
- Modulation schemes: 4, 16 and 32 QAM
- Auto adaptive modulation hitless and error free

PDH point-to-point licensed digital radio (ALFO series)

<table>
<thead>
<tr>
<th>Frequency band (GHz)</th>
<th>Product</th>
<th>Transmission capacity (Mbit/s)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Up to 16 or 100 Mbps depending on channel space</td>
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<tr>
<td>13</td>
<td>ALFO13</td>
<td>•</td>
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<tr>
<td>15</td>
<td>ALFO15</td>
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<td>•</td>
</tr>
<tr>
<td>38</td>
<td>ALFO28</td>
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</table>
SDH radio family (split series)

Main features
- Full software capacity and modulation selection
- Fast installation and commissioning
- Easy configuration upgrade
- Ethernet / fast Ethernet / gigabit Ethernet interfaces
- Extended environmental compatibility
- Nodal configuration
- Up to 600 Mbit/s / 4 x STM-1
- Frequency re-use through patented XPIC technique capacity increasing up to 800 Mbit/s in 56 MHz bandwidth
- Low cost O&M (high reliability and fast restoring of replaceable units)
- Integrated G.821/G.826/G.828 performance monitoring alarm history log, etc.
- Full availability of O&M tools (loop backs, switch manual forcing, etc.)

SDH point-to-point licensed digital radio (ALS-SDH series)

<table>
<thead>
<tr>
<th>Frequency band (GHz)</th>
<th>Type</th>
<th>Transmission capacity</th>
<th>Split mount</th>
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<tbody>
<tr>
<td></td>
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<td>STM-1</td>
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<td>6</td>
<td>ASN 6</td>
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<td>ASN 7</td>
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<tr>
<td>42</td>
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</table>
### SDH radio family (trunk series)

#### Main features
- Fully indoor radio system
- SDH capacity range: 1 x STM-1 -> 16 x STM-1 (in a single ETSI rack)
- Frequency bands: 4 GHz -> 13 GHz
- Tributary interfaces: STM-1, GE
- Modulation scheme: 64 and 128 QAM
- XPIC feature for co-channel operation
- N+1 protection scheme for alternated operation and 2 x (N+1) for co-channel operation
- Embedded HTTP server for web browser connection

#### SDH point-to-point licensed digital radio (TL trunk link SDH series)

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<th>Type</th>
<th>Transmission capacity</th>
<th>All Indoor</th>
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<td>●</td>
<td>●</td>
</tr>
<tr>
<td>6</td>
<td>TL 6</td>
<td>●</td>
<td>●</td>
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<tr>
<td>7</td>
<td>TL 7</td>
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<td>11</td>
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<tr>
<td>13</td>
<td>TL 13</td>
<td>●</td>
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</tbody>
</table>
New platform PDH/SDH/Ethernet radio family (ALS Plus2 series)

Main features

- All main feature available for radio SDH ALS series
- Monolithic 1RU IDU unit
- Dual engine solution:
  - TDM and IP traffic in native way
- Full software flexibility:
  - From 7 to 56 MHz bandwidth
  - From 4 to 256 QAM modulation schemes
- Adaptive code modulation (reduction of modulation scheme basing on transmission quality) with aim of following features:
  - Traffic classification feature to allow priority scheme
  - Link quality measurement to allow the system to react to any source degradation
- XPIC functionality available with IDU “enhanced” version
- Ethernet characteristics:
  - Ethernet frame mapping over radio link
  - Throughput from 10 to 400 Mbit/s, (1 Gbit/s with XPIC)
  - QoS management
  - Ethernet resiliency (LLF, PIRL, RSTP, ELP, LAG)
  - Level 2 (IEEE802.1p) and level 3 priorities (IPv4ToS, IPV6TC, DSCP)
  - IEEE 802.1Q VLANs, VLAN stacking (QinQ)
- Available interfaces:
  - 4FE/GE + 2E1
  - 4FE/GE + (2+16 E1)

PDH/SDH/Ethernet point-to-point licensed digital radio (ASN ODU series)

<table>
<thead>
<tr>
<th>Frequency band (GHz)</th>
<th>Type universal ODU</th>
<th>Transmission capacity</th>
<th>Split mount</th>
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<td>STM-1</td>
<td>2 x STM-1/400 Mbps</td>
</tr>
<tr>
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<td>ASN 6</td>
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<td>ASN 7</td>
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<td>ASN 8</td>
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<tr>
<td>42</td>
<td>ASN 42</td>
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</table>
Nodal configuration

Main features
- Availability for:
  - ALS SDH radio, IDU AL plus 2RU modular
  - New platform PDH/SDH/Ethernet radio
- Concept:
  - IDU AL plus 2RU modular, stacking up to 3 IDUs provisioning up to 12 directions
  - IDU ALC plus 2 RU monolithic stacking up to 8 IDUs provision up to 8 directions
  - Management SW can view all chained units as a single node
- Available interfaces:
  - IDU AL plus: STM-1 and E1 interfaces
  - IDU ALC plus 2: STM-1, Gb Ethernet, E1 interfaces
New platform PDH/SDH/Ethernet radio in nodal configuration

4 x FE/GE + 2 x STM-1 + 2 x 16+E1

N x FE/GE + N x STM-1 + N x 16E1 N=1 ... 8
Network management systems

Main features
- Configuration management
- Fault management
- Performance monitoring
- Test management
- Software management
- Security management
- Standard interface toward higher-level systems (TCP/IP, SNMP)

Network Management

<table>
<thead>
<tr>
<th>Application product</th>
<th>Managed network element</th>
<th>Max. number of simultaneous users</th>
<th>Platform</th>
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<td></td>
<td>Hardware</td>
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<tr>
<td>NMS5-LX</td>
<td>5,000</td>
<td>10</td>
<td>PC</td>
</tr>
<tr>
<td>For centralized management of medium network</td>
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<tr>
<td>NMS5-UX</td>
<td>15,000</td>
<td>25</td>
<td>Workstation or server with graphical interface</td>
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<tr>
<td>For centralized management of large network</td>
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Subnetwork Management

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<th>Managed network Element</th>
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<td>Hardware</td>
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<tr>
<td>LM/LCT link manager, local craft terminal</td>
<td>2</td>
<td>1</td>
<td>PC</td>
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<td>For maintenance and line-up activities</td>
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<td></td>
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<tr>
<td>SCT/LCT subnetwork craft terminal, local craft terminal</td>
<td>100</td>
<td>1</td>
<td>PC</td>
</tr>
<tr>
<td>For centralized management of small network</td>
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</table>
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