

**Nokia FlexiHopper™ is a reliable and flexible microwave radio for all transmission needs in mobile, fixed and private networks. Nokia FlexiHopper is available in a wide range of frequencies from 7 to 38 GHz and is complemented by the 58 GHz band Nokia MetroHopper™, which uses the same indoor units as Nokia FlexiHopper. A short lead time ensures a fast deployment of Nokia FlexiHopper.**

Nokia FlexiHopper radios support the modern 4-level  $\pi/4$ -DQPSK and 32 TCM modulation methods, allowing an operator to choose the modulation best suited for a specific hop. While  $\pi/4$ -DQPSK is more robust, 32 TCM modulation halves the required frequency channel width, which can both reduce the regulatory frequency fee and takes advantage of the better availability of narrower channels.

#### **Flexible to meet future demands**

Nokia FlexiHopper supports all capacities, 2x2, 4x2, 8x2 and 16x2 Mbit/s. Both outdoor and indoor units are independent of capacity, which helps to **keep lifetime costs low** through easy and inexpensive capacity upgrades. The selectable modulation of Nokia FlexiHopper microwave radios adds a new level of flexibility, **protecting operator investment** in the face of changing regulatory requirements and frequency congestion. For Nokia FlexiHopper and Nokia FlexiHopper 4E1, the selectable modulation feature is licensed. Both full capacity and selectable modulation are optional features.



Being modular, the Nokia FlexiHopper indoor unit can be extended and its configuration changed easily and cost-effectively. Nokia FlexiHopper includes an optional **Ethernet interface** to enable IP-traffic to share the same hop with TDM-traffic, as well as flexible capacity to meet future demands arising from the growth of IP-traffic in networks.

#### **Transmission you can rely on**

Hundreds of thousands of Nokia FlexiHopper microwave radios are being used by operators on all continents. Actual field return rates show high Mean Time Between Failure (MTBF) values of 110 years for indoor units and 35 years for outdoor units. Such figures are convincing evidence that operators can rely on their

transmission network. **Reliability** is designed into Nokia FlexiHopper by using highly integrated circuits. A single indoor unit supports up to four outdoor units, while integrated cross-connection eliminates external cabling and further improves network reliability. No E1-cabling is required on sites using Nokia base station integrated indoor units. Reduced cabling brings additional benefits by **lowering the lifetime cost** and by increasing the speed of installation.

#### **Intelligent indoor units**

Nokia FlexiHopper has several different indoor units to match each operator's needs. There are specific indoor units for Nokia base stations, as well as generic 19-inch rack indoor units.

## **Nokia FlexiHopper™ Microwave Radio – flexible wireless transmission**

All indoor units feature built-in cross-connection that allows changes to be made remotely, avoiding costly and time-consuming site visits. As the indoor units also support several outdoor units, less site space is needed.

## Network management

Nokia FlexiHopper supports Nokia NetAct™ management, which enables an operator to use the same system for both transmission and base station system monitoring. This eliminates the need to invest in a new management system. If an operator already has another management system installed, Nokia FlexiHopper can support standard SNMP management. Hopper

Manager, the graphical element manager, enables Nokia FlexiHopper to be configured remotely, reducing the need for site visits and helping operators achieve low network lifetime costs.

## Advanced features

Nokia FlexiHopper includes advanced features to ensure high quality transmission:

- Several protection methods: hot standby, space diversity, frequency diversity and polarization diversity
- One antenna solution for hot standby and dual polarization
- Dual polarization option gives 32x2 Mbit/s transmission capacity using single antenna and indoor unit

- Forward Error Correction (FEC)
- Automatic fading margin measurement and commissioning wizard to speed up installation
- Advanced Automatic Transmit Power Control (ATPC), Nokia patented Adaptive Level Control with Quality measures (ALCQ) which minimizes interference but ensures transmission quality regardless of the weather
- Low power consumption ensures maximum running time on battery backup and minimizes energy costs
- Small square antennas for unobtrusive installation
- IP-based Engineering Order Wire (EOW) for VoIP telephone use

Specifications										
<b>Frequency band (GHz)</b>	7	8	13	15	18	23	26	28	32	38
<b>π/4-DQPSK</b>										
<b>Output power (dBm)</b>	23	23	20	20	18	18	18	16	16	16
<b>Receiver threshold (dBm), BER 10<sup>-3</sup> (Channel width) *)</b>										
2x2 Mbit/s (3.5 MHz)	-94	-94	-93	-93	-93	-93	-93	-92	-91	-91
4x2 Mbit/s (7 MHz)	-92	-92	-91	-91	-91	-91	-90	-90	-88	-90
8x2 Mbit/s (14 MHz)	-89	-89	-88	-88	-88	-88	-87	-87	-86	-87
16x2 Mbit/s (28 MHz)	-86	-86	-86	-86	-85	-86	-85	-85	-83	-85
<b>32 TCM</b>										
<b>Output power (dBm)</b>	23	23	20	18	18	18	18	16	16	16
<b>Receiver threshold (dBm), BER 10<sup>-3</sup> (Channel width) *)</b>										
8x2 Mbit/s (7 MHz)	-85	-85	-82	-84	-82	-83	-81	-81	-81	-81
16x2 Mbit/s (14 MHz)	-82	-82	-80	-82	-79	-80	-78	-78	-78	-79
<b>Frequency stability</b>	< ± 10 ppm									
<b>Traffic interfaces</b>	2 x Ethernet 10/100Base-T (2–32 Mbit/s), 2 Mbit/s 75 or 120 ohm (ITU-T G.703)									
<b>Auxiliary channels (optional)</b>	EIA-232 or ITU-T V.11: max. 9600 bit/s, ITU-T V.11 or ITU-T G.703: max. 64 kbit/s Four TTL-type programmable I/O interfaces Ethernet 10Base-T IP DCN max. 512 kbit/s									
<b>Power consumption</b>	32 W (1+0), 60 W (full 1+1)									
<b>Power supply</b>	-40.5 V ... -72 V									
<b>Weights and dimensions</b>	ODU 7, 8 GHz    6 kg,    210 mm (W) x 230 mm (D) x 230 mm (H) ODU 13, 15 GHz    5.5 kg,    210 mm (W) x 210 mm (D) x 230 mm (H) ODU 18–26 GHz    4.5 kg,    210 mm (W) x 170 mm (D) x 230 mm (H) ODU 32–38 GHz    4 kg,    210 mm (W) x 120 mm (D) x 230 mm (H) IDU 1+0    3.2 kg,    444 mm (W) x 300 mm (D) x 29 mm (2/3 U) (H)									
<b>Operational temperature</b>	Indoor unit: -10 °C to +55 °C, outdoor unit: -45 °C to +55 °C									
<b>Nokia base station integrated indoor units</b>	Available for Nokia Flexi WCDMA base station, Nokia MetroSite™ and Nokia UltraSite™ GSM/EDGE and WCDMA base stations									

\*) 18 GHz: 5.0 (2x2), 7.5 (4x2/8x2), 13.75 (8x2/16x2) and 27.5 (16x2) MHz.