

# MINI-LINK 6000

Enabling 5G transport  
everywhere



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## 5G requires 5G transport

The transport infrastructure of your network is key in securing the best 5G performance for all those 200+ foreseen use cases which are enabled by 5G.

The radio evolution, introducing new interfaces and deployment architectures, drives the need for increased capacity and connectivity, lower latency, and support for increased traffic volume in 5G transport networks. Time and phase synchronization are crucial for high-performing radio traffic and support of TDD radio networks, while capabilities such as security, advanced QoS, traffic engineering and VPNs are key technologies to achieve network slicing. Programmability, SDN capabilities and machine learning enable a high degree of automation in the whole network and reduce the overall complexity and thereby operational expenses.

Microwave solutions offer high capacity, low-latency, and cost-efficient transport and are an excellent 5G transport solution together with fiber deployments. High modulation, carrier aggregation, multi-band

booster, and MIMO in the MINI-LINK 6000 portfolio will support the rapidly increasing capacity demand. Ericsson is committed to helping our customer prepare for all scenarios, and with our portfolio of 5G-ready transport solutions you can build for the future in today's networks.

## New spectrum and new radio functionality drives backhaul capacity everywhere

New NR spectrum, better utilization of the available spectrum, and introduction of coordination services such as dual connectivity and carrier aggregation increase the bandwidth and coverage leading to a higher demand for capacity in the transport network.

We see a strong continued need for microwave deployments; by 2025, around 62% of all radio sites globally, excluding North East Asia, will be connected by microwave<sup>1</sup>. The MINI-LINK 6000 portfolio is available for ubiquitous 5G transport with E-band and with traditional frequencies in both shorthaul and long haul. MINI-LINK 6000 provides 10Gbps 5G transport in urban, suburban, and rural applications.

## Increased need of high-capacity interfaces

The densification of radio sites as well as new radio interfaces drive the need for higher port density and higher capacity in microwave nodes to handle the new connections. The increased radio capacity in 5G along with the coordination functions will require high-capacity interfaces. MINI-LINK 6000 offers multiple 10GE interfaces in one node.

## Low latency required in 5G networks

Low latency is critical for coordination functions over the new radio interfaces in both non-stand-alone and stand-alone 5G deployments as well as for certain 5G use cases, such as critical IoT.

Microwave has a very low latency, lower than fiber, making MINI-LINK 6000 a perfect fit for 5G transport.

## Sync support in transport is key for TDD networks

Synchronization support in mobile backhaul is crucial for enabling TDD-based 5G radio networks and to guarantee radio performance. MINI-LINK 6000 can distribute

frequency, phase, and time sync efficiently as part of the overall sync solutions for enhanced radio coordination and 5G use cases.

#### Network slicing and automated operations

The demand for guaranteeing service quality to all the various traffic types will increase. The shift from dominant mobile broadband to multiple services supported by network slicing drives the need to manage different QoS requirements and to do this dynamically. Intelligent, automated coordination between RAN, transport, and mobile core networks is central to any robust, sustainable 5G solution. MINI-LINK 6000 offers hierarchical QoS mechanisms and open SDN interfaces supporting both network slicing and a higher degree of automation.

## Key benefits with MINI-LINK 6000

### Superior system gain enables longer hops, higher capacities, and smaller antennas

MINI-LINK has a market-leading system gain, up to 8 dB higher compared to other vendors. The higher system gain makes it possible to use higher modulations thus enabling increased capacity with the same link availability and antenna size. The additional capacity can be used to mitigate network bottlenecks, handle additional subscribers in the air interface, or add new RBS sites without affecting the existing microwave link. The superior system gain can also be used for longer hops. In E-band, this

means that we can have up to 45% longer hops compared to other vendors. Alternatively, smaller antennas with maintained capacity can be used to reduce tower rental costs or to use the saved space to set up additional links.

### Superior power efficiency enables considerable cost reductions

MINI-LINK has the best power efficiency in the microwave market today (40% lower power consumption than the industry average). Such power efficiency translates into considerable cost reductions to our customers and a substantially reduced OPEX. Additional power savings can be achieved with Traffic Aware Power Save.



Utilized in 5G networks



Extensive portfolio  
for all needs



Ease of deployment  
– fast time to market



# MINI-LINK 6000



## MINI-LINK 6000 enabling ubiquitous 5G transport

With unmatched flexibility, MINI-LINK 6000 provides the right solution for each part of the network, all deployment scenarios and site types, enabling sound investments in line with the service

providers' needs. The portfolio offers both split mount and all outdoor shorthaul as well as long haul solutions covering the complete microwave spectrum from 4 up to 80 GHz. MINI-LINK 6000 offers advanced packet

functionality including advanced sync and L3 VPN, using IP/MPLS, as well as L2. All network scenarios are supported with superior performance combined with the lowest possible cost of ownership.

## Split mount shorthaul

With best-in-class radio link units, split mount shorthaul provides high capacity in all frequencies with superior system gain and power efficiency.

The MINI-LINK 6600 family provides the highest node capacity in the smallest form factor with fixed and semi-modular nodes. MINI-LINK 6600 supports multiple radio links with a capacity of up to 2.5Gbps per link. Using high modulation

schemes, 8k QAM, XPIC, carrier aggregation, MIMO, Multi-band booster, wide channels like 224 MHz, low latency, and multiple 10G interfaces ensures deployment flexibility and future-readiness. In addition, MINI-LINK 6600 also supports TDM traffic.



### MINI-LINK 6363

The world's smallest high power radio unit

- 6-80 GHz
- 8k QAM



### MINI-LINK 6364

The world's smallest sub-band free high power radio with carrier aggregation

- 13, 15 and 18 GHz
- 8k QAM
- Carrier aggregation



### MINI-LINK 6365

The world's smallest high-power radio with carrier aggregation

- 6-42 GHz
- 8k QAM
- Carrier aggregation



### MINI-LINK 6651/4

Compact 10Gbps multi-band booster node

- 2 carriers
- Up to 44Gbps switch capacity
- 1GE and 10GE interfaces



### MINI-LINK 6651

Compact end-node

- 1 or 2 carriers
- 14.5Gbps switch capacity
- 1GE and 2.5GE interfaces



### MINI-LINK 6654

Small aggregation node

- Up to 6 radio links and 6 directions
- 44Gbps switch capacity
- 1GE and 10GE interfaces



### MINI-LINK 6655

Medium aggregation node

- 10 radio links in 8 directions
- 44Gbps switch capacity
- 1GE and 10GE interfaces



### MINI-LINK 6691

Small aggregation node

- Up to 4 radio links in 4 directions
- Up to 90Gbps switch capacity
- 1GE and 10GE interfaces



### MINI-LINK 6693

Medium aggregation node

- Up to 8 radio links in 7 directions
- Up to 90Gbps switch capacity
- 1GE and 10GE interfaces



### MINI-LINK 6694

Medium aggregation node

- Up to 8 radio links in 8 directions
- 90Gbps switch capacity
- 1GE and 10GE interfaces
- NPU Protection



### MINI-LINK 6692

Large aggregation node

- Up to 16 radio links in 15 directions
- 90Gbps switch capacity
- 1GE and 10GE interfaces
- NPU Protection

## All outdoor shorthaul

MINI-LINK all outdoor products offer Gbps capacities using traditional frequencies (6–42 GHz), and up to 10Gbps capacities with E-band 70/80 GHz.

As the name indicates, they provide a compact all-outdoor solution for sites where indoor space is limited.



### MINI-LINK 6366

Flexible outdoor solution for integrated or separate mount

- 2.5 Gbps over 2 carriers
- 6-80 GHz
- 9.5Gbps switch capacity,
- 1GE and 2.5GE interfaces
- XPIC and Multi-band booster
- Multiple mounting solutions: integrated, separate and rail.



### MINI-LINK 6371

All outdoor solution for 5G capacities

- 2.5Gbps over 2 carriers,
- prepared for 5Gbps over 4 carriers
- 10Gbps with Multi-band booster
- 6-80GHz
- 8k QAM
- 35Gbps switch capacity,
- 1GE and 10GE interfaces
- XPIC, Carrier Aggregation and Multi-band booster, prepared for MIMO
- Multiple mounting solutions: integrated, separate and rail



### MINI-LINK 6352

High capacity E-band radio

- 10Gbps capacity
- XPIC support
- Equipment Protection
- Multi-band booster support
- Wireless fronthaul for eCPRI connections

## Long haul

Ericsson provides the first long haul system on the market designed for 5G transport. The product family provides market-leading capacities, up to 10Gbps over 35 km/22 miles with 4096QAM.

Successful deployment of links over more than 150 km/90 miles with 2-4 Gbps. Support is provided for L2 and L3, five 10GE interfaces, low latency, as well as phase and time sync. The product family

contains large rack-mounted units for high capacities, compact and super compact units, as well as split mount implementations.



### MINI-LINK 6291

Split implementation

- 2–16 channels
- 90Gbps switch capacity
- Up to 10Gbps link capacity



### MINI-LINK 6251

Super compact

- 2–4 channels
- Up to 90Gbps switch capacity
- Up to 2Gbps link capacity



### MINI-LINK 6252

Compact

- 2–12 channels
- 90Gbps switch capacity
- Up to 7.5Gbps link capacity



### MINI-LINK 6262

Rack mounted

- 2–16 channels
- 90Gbps switch capacity
- Up to 10Gbps link capacity

## Additional product

A wide range of antennas and accessories are available to support our different microwave solutions. The antennas size from 0.1m/5in up to 3.7m/12ft and support different frequencies from 4 GHz up to 80 GHz. Dual-band antennas are available facilitating fast and cost-efficient rollout of multi-band booster deployments over one antenna, while reducing tower rental costs.

## Advanced Microwave Insights

Advanced Microwave Insights uses AI and machine learning to save operator's time on analysis of MINI-LINK transmission issues and reduces unnecessary site visits. It improves the customer experience and network performance at a reduced cost.

# Evolve your network to support 5G

## 1. Boost transport in dense urban areas

Use E-band to boost Microwave capacity for macro or street macros

Use E-band as wireless Fronthaul for eCPRI as a complement to fiber in C-RAN deployments.



## 2. Boost suburban backhaul capacities

Boost capacity with 224 MHz channels and multi-carrier solutions

E-band or Multi-band to FWA if fiber is not available

## 3. Evolve rural coverage and capacity

Use microwave for cost-efficient coverage for 4G and 5G

Increase microwave capacity with Multi-band to boost 4G performance

## 4. Build for coverage and redundancy

Extend rural coverage with long haul solutions and use long haul for redundancy to fiber

MINI-LINK 6000 supports network evolution and expansion in a cost-efficient way. Flexibility is key when addressing backhaul challenges. Site-specific requirements, such as time-to-market considerations and the quality of available backhaul assets, will determine the best solution.

### Supporting capacity evolution

As the evolution towards 5G continues, we can also see that microwave technology is keeping pace with needs. The increased use of the E-band and wider channels such as 224 MHz in traditional microwave bands shows that the microwave transport technology meets the current and future capacity needs of radio sites.

In addition, MINI-LINK has best-in-class spectrum efficiency while making the most out of the available spectrum. MINI-LINK provides up to 8k QAM adding up to 12% more capacity compared to 4k QAM and 22% more capacity compared to 2k QAM.

Line-of-sight MIMO dramatically increases the efficiency in utilizing the available spectrum.

Multi-band booster is a flexible way of catering for the 5G transport requirements. It combines the best characteristics of different frequency bands to boost capacities, unleashing the use of higher frequencies over longer distances and much wider geographical areas. Multi-band booster uses a low-band radio to provide a high-availability connection and combines it with a higher band that provides a significant increase in capacity, but with a slightly lower availability. Priority traffic handling is applied. Ericsson's unique hierarchical Radio Link Bonding (hRLB) enables very efficient traffic handling in 10Gbps Multi-band booster solutions. These solutions will be essential in supporting future performance needs and will further increase the use of higher frequencies.

Carrier aggregation is used to increase capacity and coverage. With carrier aggregation, two separate channels can be

supported by a single radio. This makes it possible to use the full capacity of adjacent and non-adjacent channels with one radio. This can be very useful when the spectrum is scattered and it is hard to get licenses for wide channels. The use of a single radio for two channels will reduce the tower footprint and the power consumption. It also allows for a scalable expansion of the network.

### Flexible and modular solutions for any deployment scenario

The flexibility that can be achieved in the network thanks to software upgrades along with node and hop compatibility makes it possible to invest when and where necessary. This prevents the over-dimensioning of the network, which would translate into excessive costs.

The larger MINI-LINK nodes use plugin units, which make it easy to customize configurations and make future upgrades. By reusing existing MINI-LINK equipment, filling up empty slots, and just adding a new modem and radio, the savings can be up to 40%.

**Advanced packet handling**

MINI-LINK 6000 has integrated Ethernet Switching functionality and supports L3 VPN using IP/MPLS, thus reducing the cost and complexity by not needing external equipment. Hierarchical QoS enables the sharing of networks between several operators with multiple technologies as well as network slicing.

**Industry-leading performance with Ericsson Radio System**

Our portfolio of transport solutions is part of the Ericsson Radio System, ensuring a smooth evolution path with complete site solutions, shared air flow designs and maintenance features that ultimately reduce OPEX. Ericsson Radio System is designed to fit all site types and traffic scenarios, even as networks grow in scale and complexity, from 2G, 3G, 4G, and 5G, delivering industry-leading performance on the smallest site footprint with the lowest energy consumption.

**Ericsson Network Manager and Ericsson Dynamic Orchestration**

With Ericsson Network Manager (ENM), all network technologies can be handled in a single management platform. Ericsson

Network Manager provides a single interface for management and visibility of the entire mobile network.

Implementing SDN-based management that uses open and standard interfaces provides a framework for policy-driven automation and end-to-end orchestration, for radio and transport, and for efficient roll-out of 5G services with network slicing. With this framework, the Ericsson Orchestrator provides both transport and cloud capabilities. It also offers end-to-end L2 and L3 transport services provisioning of the different transport slices.

The cloud orchestration part provides Network Functions Virtualization Orchestration (NFVO) capabilities and generic Virtual Network Function Management (VNFM). This enables the life cycle management of virtualized network functions and both intra- and inter-data-center connectivity.

The Service Orchestrator provides the glue between the transport and the cloud domains. As parser and orchestrator of service templates, it can decompose and translate each request into provisioning queries for the transport and the cloud orchestration components.

**MINI-LINK – the market leader**

**The market leader in microwave transmission**

MINI-LINK is the market leader in microwave transmission, with 880 customers in 180 countries. MINI-LINK is in use in all the world's climate zones.

Ericsson has delivered over 4.5 million microwave radio units since the late 1970's.

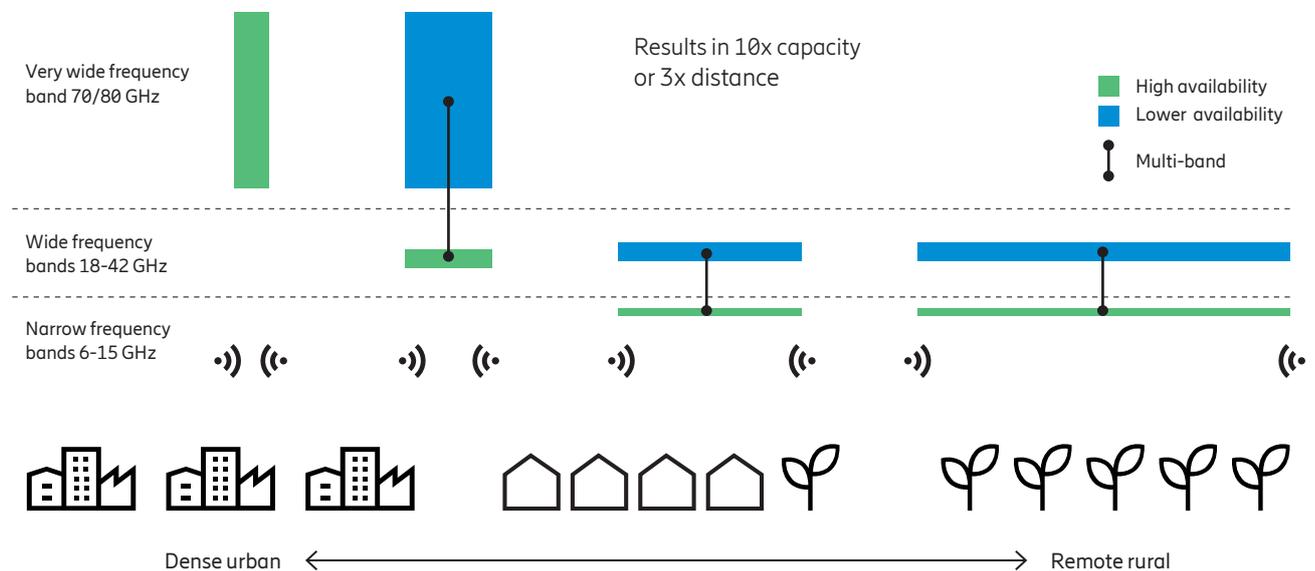
**Mobile broadband over long distances with 2.3Gbps over 128 km**

A microwave hop of 2.3Gbps over 128 kilometers is today successfully enabling Mobile Broadband on the distant Batanes islands in the northern Philippines.

**E-band microwave produces fiber-like results with 100Gbps over 1.5 km**

Ericsson Reserach, together with Deutsche Telecom, has demonstrated fiber-like results for microwave in the E-band with achieving more than 100Gbps over a 1.5-kilometer hop.

**Multi-band booster**



Ericsson enables communications service providers to capture the full value of connectivity. The company's portfolio spans Networks, Digital Services, Managed Services, and Emerging Business and is designed to help our customers go digital, increase efficiency, and find new revenue streams. Ericsson's investments in innovation have delivered the benefits of telephony and mobile broadband to billions of people around the world. The Ericsson stock is listed on Nasdaq Stockholm and on Nasdaq New York.