



ERICSSON

# High-capacity Microwave backhaul for all sites

**Solution brief**

# High-capacity wireless backhaul for all sites

With 5G spreading around the globe, 5G and high-capacity backhaul is needed, not only in the city but also in the suburbs and rural areas. MINI-LINK 6000 offers high-capacity connectivity to sites with both fast times to market and ease of deployment. It is a perfect solution when the fiber is too costly or too slow to implement. MINI-LINK has several ways to increase capacities to existing sites and build high-capacity solutions for new sites. Several SW features are available that will take you to higher speeds, and the new HW will give another incremental option. Capacities up to 10Gbps over a single microwave hop are available, and up to 20Gbps by combining two microwave radios in the same hop.

Different 5G sites have different requirements and need different kinds of solutions. When expanding a 4G site to include 5G low band (0.6-2.6GHz FDD), e.g., by utilizing Ericsson spectrum sharing solution, the site's backhaul capacity will increase up to 1Gbps. When expanding to the 5G mid band (2.3-6GHz TDD), higher capacities are reached in RAN, and conclusively high backhaul capacities are required. Depending on the site, it can be up to 10Gbps. Finally, when adding the 5G high band (24-42GHz TDD), up to 20Gbps backhaul capacity can be required.

Synchronization support in mobile backhaul is also crucial to enable TDD-based 5G radio networks and guarantee radio performance. MINI-LINK 6000 can distribute frequency, phase, and time sync efficiently.



MINI-LINK 6000

Multi-band booster uses a microwave radio within the traditional microwave frequency range (6-42GHz), e.g., using a MINI-LINK 6365, that provides a high-availability connection and combines it with an E-band radio (70/80GHz), a MINI-LINK 6352, that provides a significant increase in capacity, but with slightly lower availability. This is the perfect way to extend the reach of the E-band up to 3 times or boost the capacity of

a traditional band by 10 times. All the traffic is sent over the same antenna, saving on tower rental costs. Two microwave radios within the traditional frequency range can also be combined (e.g., 6 and 11 GHz), increasing capacity over one antenna. Ericsson's unique hierarchical Radio Link Bonding (hRLB) enables very efficient traffic handling in multi-band solutions allowing for up to 99% utilization of all radios combined.

# Boost capacity at existing sites in dense urban areas

## Challenge

When upgrading a site from 4G to 5G, medium and high bands in a dense urban area, the backhaul capacity could increase from 1Gbps up to 20Gbps capacity.

## Solution

If the site already uses an E-band link (70/80GHz) as backhaul, the channel width and capacity can easily be increased to 10Gbps. If capacities of up to 20Gbps are required, a second E-band radio can be added in a dual polarization hop, still over one single antenna.

If the existing backhaul is a MINI-LINK within the traditional frequency bands (6 – 42GHz), E-band is available, and the hop length and rain zone allow it, change the existing backhaul to E-band, MINI-LINK 6352 and reach 10Gbps. And 20Gbps is achieved with two E-band radios over one single antenna. If the hop length is too long, or the rain zone is too high, the

solution would be to add an E-band radio with the existing radio in a multi-band solution to reach 10 Gbps over the same hop. With Ericsson radios in both frequencies, the Ericsson unique hRLB (Hierarchical Radio Link Bonding) can be used with extremely high utilization, up to 99%, of both bands. Multi-band antennas are also available to keep the site to a minimal footprint, i.e., one antenna handles both frequency bands, enabling a lower tower rental cost.

If the traditional microwave link is from another vendor, a multi-band solution can still be used by adding the MINI-LINK 6352 to the traditional frequency hop. Policy forwarding will be used on the link with slightly lower utilization of the hop compared to hRLB.



### MINI-LINK 6352

- High-capacity E-band link
- 10Gbps capacity
- 20Gbps with XPIC and two radios
- Wireless fronthaul for eCPRI connections

# New high-capacity sites in a dense urban area

## Challenge

The challenge for many new sites in the dense urban area, whether macro rooftop sites or street sites, is access to fiber for transport. Fiber can already be available on the street or in the building. But if it is not, it can be difficult and time-consuming to get permission to dig up a street to deploy fiber or get fiber drawn in a building to reach the rooftop.

## Solution

For new sites requiring up to 10Gbps backhaul, where fiber is too hard, too expensive, or too slow to implement, the solution would be to use an E-band link, both for macro and street sites. The MINI-LINK 6352, with a 10Gbps backhaul capacity, and a low spectrum fee in many countries, can easily be installed on a roof, a lamppost, or a wall. For capacities up to 20Gbps, you can use two MINI-LINK 6352, with dual polarization over one antenna.

MINI-LINK 6352 could also be used for wireless fronthaul. eCPRI radios can be connected to the RAN compute unit using MINI-LINK 6352 over shorter distances to complement traditional fiber-based solutions. Adding a radio on a neighboring rooftop can easily and quickly be done if line-of-sight is available.



### MINI-LINK 6352

- High-capacity E-band link
- 10Gbps capacity
- 20Gbps with XPIC and two radios
- Wireless fronthaul for eCPRI connections

# Boost capacity to existing suburban or rural hub-sites

## Challenge

When expanding a suburban or rural hub-site to 5G NR, there are many things to consider, not only for RAN but also for transport. Which backhaul capacities are required for the end-sites and north-bound? Which transport equipment is available? Can it be reused and upgraded?

## Solution 1

If E-band spectrum (70/80GHz) is available to use for backhaul to the site, and the existing hub-site uses MINI-LINK with traditional microwave frequencies 6-42GHz, a good solution would be to add an E-band radio, a MINI-LINK 6352, in a multi-band solution with the existing radio, to reach 10 Gbps over the same hop. This can be

done over a single antenna, saving on tower rental costs. By using a split-mount MINI-LINK 6600 as an indoor unit, with NPU 1005 as node processor and the MMU 1005 modem unit, you can have as many as four 10Gbps multi-band booster hops located on the same hub-site.



### Multi-band booster link

- MINI-LINK 6352 (E-band)
- MINI-LINK 6365 (6-42GHz)
- 10Gbps up to 10km
- A combination that extends the reach of E-band up to 3 times or boosts the capacity of a traditional band by 10 times.



### MINI-LINK 6693

- 40Gbps at one hub-site with Multi-band booster, use NPU 1005 and MMU 1005

## Solution 2

When only traditional microwave frequencies (6-42GHz) are available for backhaul at the hub-site, or the hop distance is too long (>10-12km) for an E-band or multi-band booster hop, the capacity can still be given a considerable boost. Changing from fixed modulation to adaptive modulation can increase capacity up to 150%. If the existing site uses 56MHz channels, you can increase the capacity from two up to four-fold using wider channels like 112 and 224MHz. Adding a second polarization

radio doubles the capacity. By combining two MINI-LINK 6365 microwave radios in a 4+0 hop, you can achieve as much as 4.8Gbps. The carrier aggregation function of the MINI-LINK 6365 enables much lower power consumption for a 4+0 configuration compared to using a two times "dual-transmitter-dual-receiver" solution. To enable carrier aggregation with MINI-LINK 6365, the indoor unit MINI-LINK 6600 needs modem units MMU 1002, 1004, or 1005.



### MINI-LINK 6365 with 4 +0

- Two MINI-LINK 6365
- Up to 4x112MHz
- Up to 4.8Gbps
- Low power consumption



### MINI-LINK 6693

- 4,8Gbps over one hop with 4+0 carrier aggregation, use MMU 1002, MMU 1004 or MMU 1005

# Boost capacity at existing end-sites

## Challenge

With the introduction of 5G and RAN spectrum sharing at an end-site the capacity requirement can increase up to 1Gbps.

## Solution

The capacity can easily be increased for existing sites with microwave backhaul via software. Simply add capacity licenses or change from fixed modulation to adaptive modulation and increase capacity up to 150%. If the existing site uses 56MHz channels, you can increase the capacity from two up to four-fold,

using wider channels like 112 and 224MHz. If the HW allows it, you can use carrier aggregation to double the capacity. It is also possible to add additional hardware to increase capacity, like dual polarization with XPIC and carrier aggregation, all with one antenna.



## MINI-LINK

Increase capacity of the existing MINI-LINK via SW capacity licenses, adaptive modulation, wider channels, added channels, or additional HW.



# New end-sites

## Challenge

For the introduction of new 5G low band end-sites, a future-proof solution is necessary to allow for capacity growth.

## Solution 1

MINI-LINK 6651/4 is a versatile high-capacity compact indoor end node that, together with a MINI-LINK 6365 microwave radio, can deliver 2.5Gbps. For future needs, it can be combined with an E-band radio to achieve 10Gbps, using a Multi-band antenna.

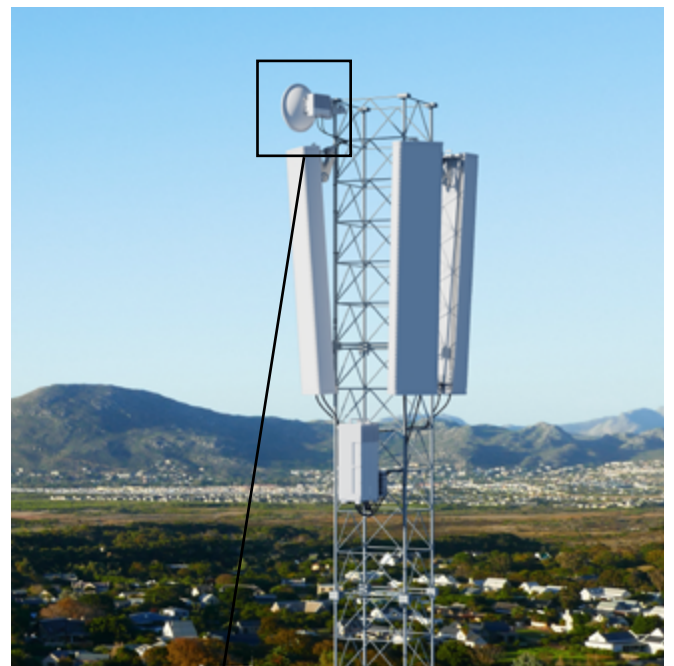


### MINI-LINK 6651/4 & MINI-LINK 6365

- High-capacity end-sites
- Split-mount solution
- 2.5Gbps
- 10Gbps with multi-band booster
- 4x10GE interfaces

## Solution 2

The MINI-LINK 6371 is an all-outdoor solution with Zero footprint & easy installation, perfect for limited availability of indoor space. The flexible mounting suits different site requirements. MINI-LINK 6371 enables up to 2.5Gbps together with MINI-LINK 6365. It is HW prepared for 4.8Gbps in a 4+0 set up with two MINI-LINK 6365, all on one antenna. For future needs, it can be combined with an E-band radio to achieve 10Gbps, using a Multi-band antenna.



### MINI-LINK 6371 & MINI-LINK 6365

- Zero footprint – all outdoor
- High-capacity end-sites
- 2.5Gbps with one MINI-LINK 6365
- 10Gbps with multi-band booster
- 3x10GE interfaces

# Adding Fixed Wireless Access at existing sites

## Challenge

For a speedy and cost-efficient rollout of FWA to existing Mobile Broadband sites, you need to reuse as much as possible from the existing site while increasing capacity and enabling defined Quality of Service that fits the FWA requirements.

## Solution

The capacity can easily be increased for existing sites with microwave backhaul via software. Simply add capacity licenses or change from fixed modulation to adaptive modulation and increase capacity up to 150%. If the existing site uses 56MHz channels, you can increase the capacity from two up to four-fold using wider channels like 112 and 224MHz. If the HW allows it, you can use carrier aggregation (using two channels in one microwave radio) to double the capacity. It is also possible to

add additional hardware to increase capacity, like using dual polarization with XPIC and carrier aggregation, all with one antenna. With traditional microwave frequency bands, you can reach up to 4.8Gbps. By combining the traditional microwave frequency bands with E-band (80 GHz) you can reach up to 10Gbps. MINI-LINK also has advanced QoS mechanisms that can support the QoS KPI required by FWA.



### MINI-LINK

- Increase capacity of the existing MINI-LINK via SW capacity licenses, adaptive modulation, wider channels, added channels, or additional HW.

# A new Fixed Wireless Access site

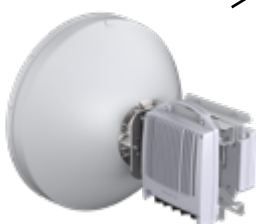
## Challenge

For launching a successful FWA service in a new area, you require a speedy and cost-efficient roll out with high capacities and a defined Quality of Service that fits the FWA requirements.

## Solution

When launching FWA to a new site where dark fiber is unavailable, or fiber is too costly or slow to deploy, microwave backhaul with E-band or multi-band offers fast and cost-effective rollouts with a high capacity of up to 20Gbps. Microwave can also be used as a temporary solution while waiting for fiber. Depending on the capacity requirements, the hop distance, and the rain zone, several different MINI-LINK options are available. For long hops, over 12km, and capacities up to 2.5Gbps, one single MINI-LINK 6365 can be used with a MINI-LINK 6651/4 or a MINI-LINK 6371 as

a node unit. For short hops, up to 3 km, and high capacities, the E-band microwave radio MINI-LINK 6352 with up to 10Gbps capacity could be the best choice. For hops up to 10-12km, or high rain zones, the multi-band solution, combining the traditional frequency MINI-LINK 6365 with the E-band MINI-LINK 6352, reaching 10 Gbps over one antenna, is a good solution. MINI-LINK also has advanced QoS mechanisms that can support the QoS KPI required.



### Multi-band booster link

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- MINI-LINK 6365 (6-42GHz)
- 10Gbps up to 10km
- A combination that extends the reach of E-band up to 3 times or boosts the capacity of a traditional band by 10 times.

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.

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