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Ericsson Microwave Outlook

Telefónica Germany's
perspective on using
E-band for 5G

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5G drives both the need for increased backhaul capacities and for new sites for 5G coverage.

As a prioritized activity, the service provider Telefónica Germany is currently looking for backhaul capacities of up to 10Gbps to connect both 4G and 5G sites to their backbone network. Telefónica Germany has a long tradition of using microwave as the backhaul media to complement fiber and sees value in the continued use of microwave for 5G, especially the use of E-band. The high availability of E-band spectrum compared to legacy frequencies, as well as the high capacity, makes E-band a good option for such connections.

Telefónica Germany started to introduce E-band systems in 2014, and the first of these were able to support 3.5Gbps over one carrier. E-band has since accounted for the majority of all new microwave installations, as can be seen in Figure 7, to support the ongoing 5G roll-out, with a large growth in the last year of almost 50 percent.

The preferred deployment strategy for urban and suburban areas is to use 1+0 systems with 5Gbps in a single radio,

with a dual-polarized antenna from the start. This enables the option to upgrade the system by adding another 5Gbps radio on the second polarization when needed. Additionally, inter-frequency aggregation (IFA) systems, also called Multi-band systems, are being introduced for longer hops in rural areas; the very first links have already been installed.

The majority of Telefónica Germany's E-band installations, 75 percent, are located in urban and suburban areas. Most systems are placed on flat roofs, where the hop lengths and capacity needs are perfect for E-band. There are also some E-band systems, 12 percent, that are installed on masts or chimneys. The most common installations use 0.3m+0.3m antennas, and the lengths of the installed links are generally up to 3km. The IFA (or Multi-band) systems, that are combinations of E-band with legacy microwave systems, use 0.6m+0.6m antennas and have a hop length of up to 8.5km, have also been realized, as can be seen in Figure 8.



Telefónica is one of the largest telecommunications service providers in the world. The company offers fixed and mobile connectivity, as well as a wide range of digital services for residential and business customers.

Telefónica operates in Europe and Latin America, with 367 million customers worldwide. Telefónica Germany is one of the leading integrated telecommunications providers in Germany with 45 million customers and is building a high-performance, energy-efficient 5G network that will reach 30 percent of the population by the end of 2021.

Figure 7: Installed microwave at Telefónica Germany

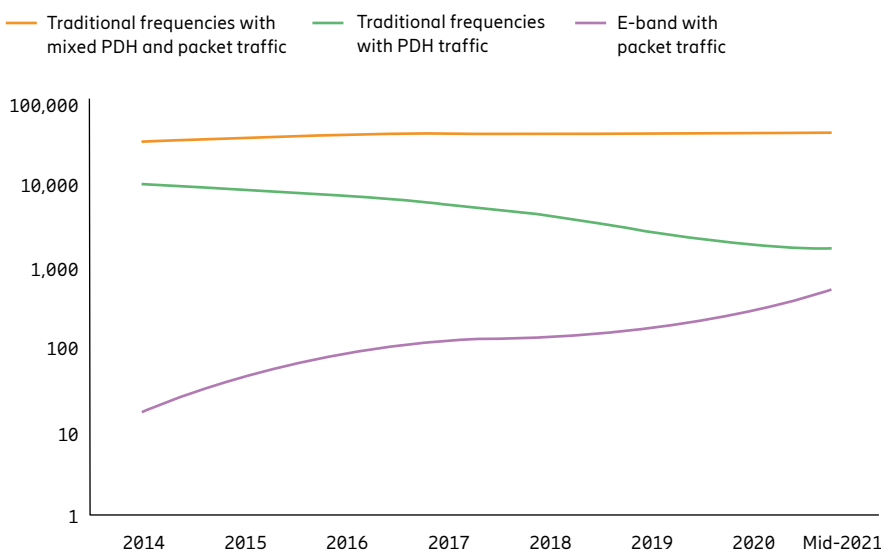


Figure 8: Distribution of Telefónica Germany’s E-band antennas and system configurations

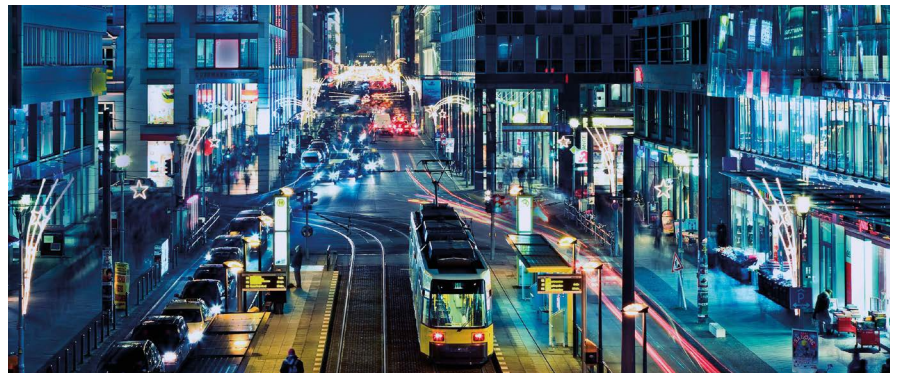
Antenna configuration	0.3m+0.3m		0.3m+0.6m		0.6m+0.6m	
System configuration	Number (%)	Max. distance (km)	Number (%)	Max. distance (km)	Number (%)	Max. distance (km)
1+0	60	2.48	12	3.08	10	3.05
2+0	12		3			
IFA 3+0					1	8.43

Telefónica Germany has learned a lot about E-band during the roll-out in recent years:

- a. E-band fulfills the requirements of 5G.
- b. Using the 0.6m antenna on a pole requires a more stable pole than the standard used by Telefónica. This must be considered during the planning.
- c. Alignment of 0.6m E-band antennas requires more attention than for lower frequencies.

Other learnings from preparing for the roll-out of E-band include:

- a. As all outdoor installations are always integrated with the antenna, the accessibility of the active components for maintenance has to be ensured by retrofitting ladders or platforms, or alternatively by installing a 2+0 system.
- b. Dependency on legacy technologies, such as time-division multiplexing (TDM), needs to be removed. E-band is set to become a key building block on the way towards modernized and competitive 5G-ready RAN design.



E-band has proven itself to be an excellent way to handle the required 5G capacities.

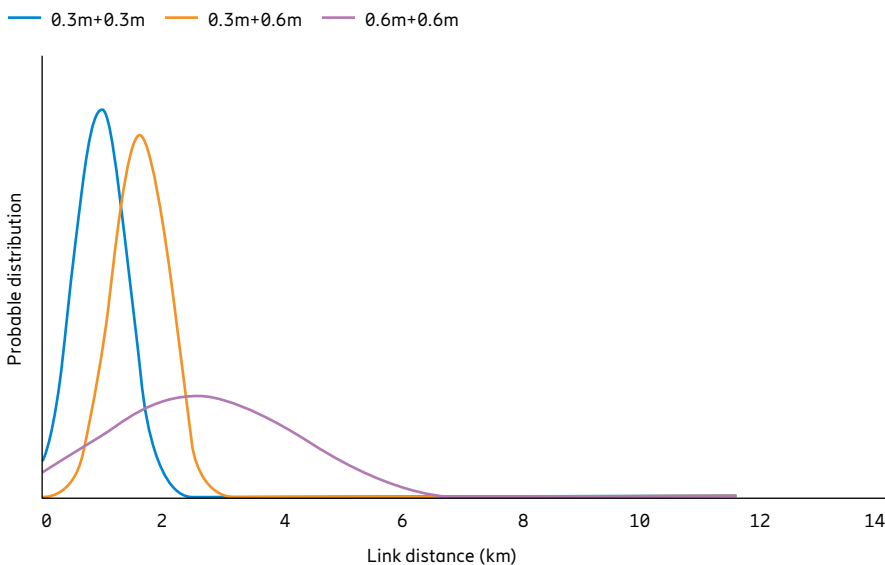
Going forward

Telefónica Germany plans a massive deployment of E-band systems in the run-up to 2025, to address the roughly 60 percent year-on-year traffic growth. The overall E-band network share, compared to traditional microwave systems, will increase from 1 percent as of today to 20 percent by 2025. Longer link lengths, from 3–10km, will be deployed as Multi-band systems. Telefónica

Germany plans to move all microwave systems to a capacity larger than 2Gbps by 2025. This will be achieved by using a mix of 112MHz, 224MHz, E-band and D-band.

It is apparent that E-band, as standalone or in Multi-band solutions, is an excellent way to handle the required 5G capacities, and to support the quick roll-out of 5G in both urban and suburban areas in the German market.

Figure 9: Planned distribution and distance of Telefónica Germany’s E-band configurations



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