

TRAFICOM

Finnish Transport and Communications Agency

mmWave for 5G in Finland

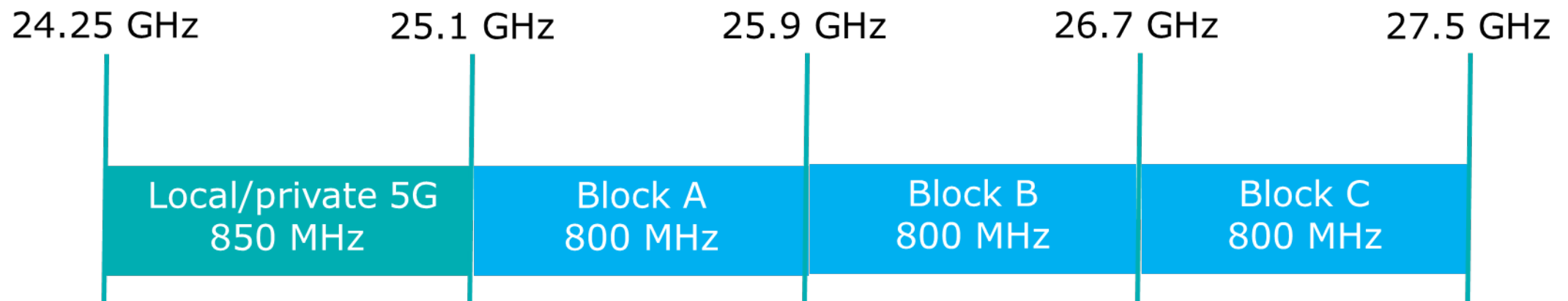
**mmWave: Europe's 5G game changer -
sharing early success stories**



Spectrum auction for 26 GHz frequency band

In Europe, three frequency bands have been identified as pioneer bands for 5G networks. In Finland, the 700 MHz band and the 3.5 GHz band are already assigned for this purpose through the previous auctions, and the third pioneer band of 26 GHz was auctioned already in June 2020 as one of the first countries in Europe.

Finland has granted more frequencies per operator in the 26 GHz band than any other country in the world.



Spectrum auction for 26 GHz frequency band

Spectrum auction June 2020

- ▶ Auction preparations started in Autumn 2019 on such issues like the definition of the size and number of spectrum blocks, decision on the auctioned spectrum and dedicated spectrum for private networks, starting price per block, auction mechanism (SMRA), technical licence conditions etc.
- ▶ The Ministry of Transport and Communications circulated the Government decree on the auction of radio frequencies in the 25.1-27.5 GHz for consultation in February 2020. The decree contained provisions regarding the standard provisions for the frequency auction, such as the number of frequencies, the maximum number of frequencies to be allocated to an organization, the auction model to be used, the starting bids, the participation fee, and the payment schedule for the license.
- ▶ The consultation also amended the Government decree (1246/2014) on radio spectrum use and frequency allocation plan so that the frequency allocation plan would be amended to cover the 25.1-27.5 GHz band intended for auction.

Outcome of the 26 GHz spectrum auction

Spectrum auction started 8th of June 2020 and was concluded after a few rounds.

- ▶ Elisa Corporation 25.1-25.9 GHz, 7 million euros
- ▶ Telia Finland Plc 25.9-26.7 GHz, 7 million euros
- ▶ DNA Plc 26.7-27.5 GHz, 7 million euros

On 17 June 2020, the Government granted network licenses for the 26 GHz spectrum to Elisa Corporation, DNA Plc and Telia Finland Plc, in accordance with the outcome of a spectrum auction. The frequencies are available to the telecom operators for the construction of high-speed wireless 5G networks from the beginning of July.

The frequency band of 26 GHz can be used for the construction of 5G networks as of 1 July 2020. The licenses will remain valid until 31 December 2033 in mainland Finland.

Current status of the licensed MNO 26 GHz spectrum

- ▶ MNOs have rolled out commercial 26 GHz services only to some special locations. Roll-out has been slower than was expected due to various reasons caused by COVID-19 due to component shortage and the lack of mmWave capable mobile terminals for big audience.
- ▶ In technology pilots on the mmWave bands the 5G speeds up-to 8 Gbps downlink direction and 2 Gbps uplink direction have been reached, so capacity is there.
- ▶ Main drivers for mmWave deployment at the moment are FWA and private networks.

Spectrum for private 5G networks

24.25-25.1 GHz

The Government decree (1246/2014) on radio spectrum use and frequency allocation plan defines that frequency band 24.25-25.1 GHz can be used for **private networks** and for the **research, development and educational purposes**. The above mentioned degree defines several geographical areas especially for research, development and educational purposes by placing restrictions for the use to auction winners in these locations.

Similar approach (research, development and educational purposes) has been done for other licensed frequency bands earlier, such a bands are TV UHF, 1800 MHz, 2100 MHz, 2600 MHz and 3600 MHz. Traficom will also issue short term test licenses (one year) to any other frequency band allocated to mobile and fixed service when possible.

Areas reserved for research, development and educational purposes (Capital area, Tampere and Oulu)

- ▶ Capital area, Helsinki-Espoo-Vantaa (~1 400 000 inhabitants)
 - ▶ Frequency range 24.7-25.1 GHz
 - ▶ Red area (~170 000 inhabitants)
 - ▶ Frequency range 24.3-25.1 GHz
 - ▶ Green area (~11 300 inhabitants)
- ▶ Frequency range 3640-3700 MHz
 - ▶ Red area
- ▶ Frequency range 3620-3720 MHz
 - ▶ Green area



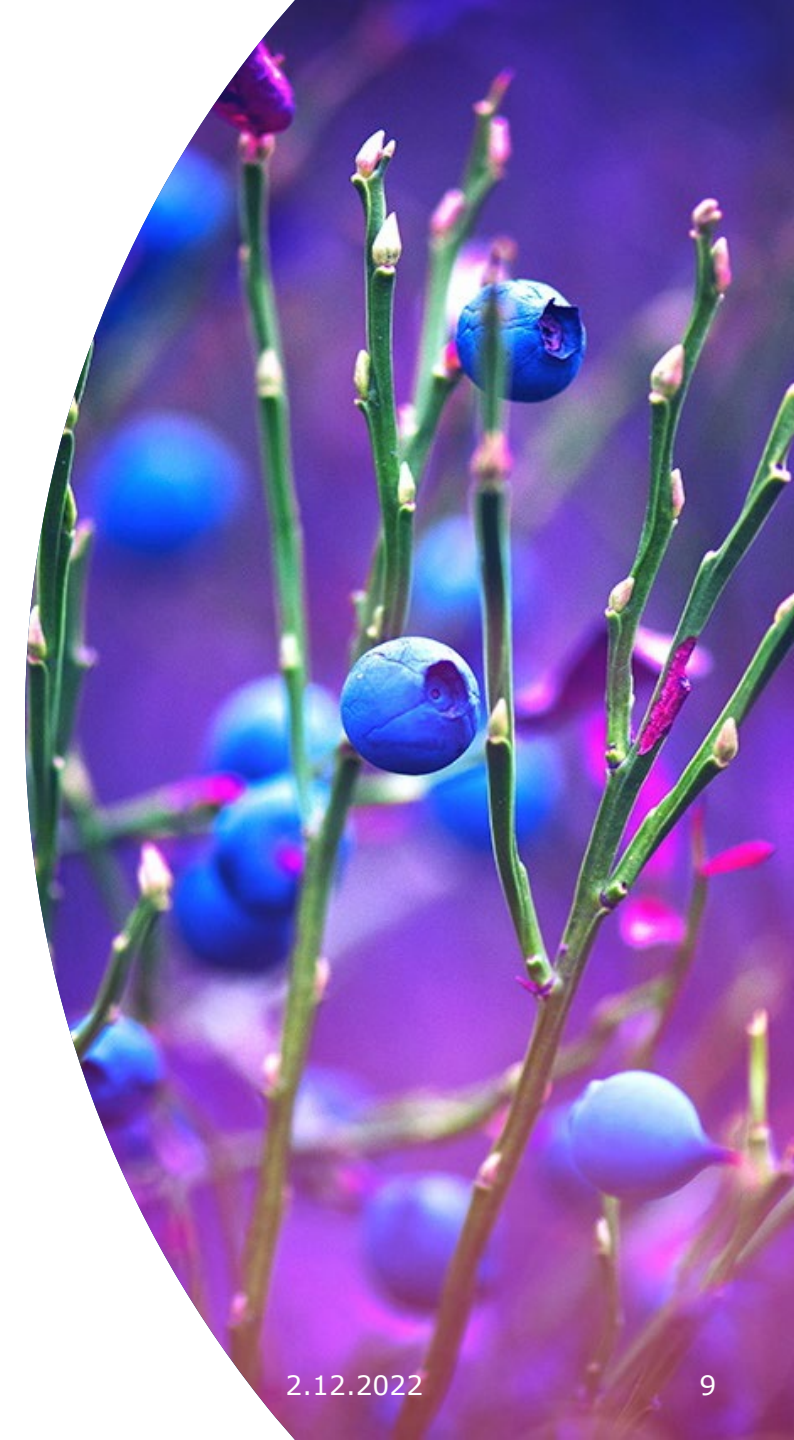
Private/local networks 5G use cases and observations in mmWave (26 GHz)

- ▶ Current legislation allows also limited public service networks e.g. shopping malls, stadiums etc. – No such applications yet.
- ▶ Licences have been issued to Nokia, VTT Technical Research Centre of Finland Ltd. (Oulu), Aalto University (Espoo) and Savonia University of Applied Sciences (Kuopio). Private/local 5G networks operated by MNOs are not considered here.
 - ▶ Product development, R&D
 - ▶ 4G/5G/6G test networks, e.g. [6G Flagship](#)
- ▶ Most networks are still based on NSA mode, thus require additional LTE band, in all cases, so far, it has been possible to get some licensed spectrum from operators to support mmWave deployments.
- ▶ Equipment availability is still a problem for mmWave deployments.

General information on local 4G/5G networks in Finland

Frequency bands 2300–2320 MHz and 24.25–25.1 GHz are available to local 4G/5G networks with Traficom's radio license.

- ▶ **Annual frequency fee** in the 24.25-25.1 GHz is ~620€/100 MHz and ~280€/5 MHz at 2.3 GHz.
- ▶ **Licenses will be issued on the first-come-first served basis.**
- ▶ **Existing radio licenses** can be found at <https://www.traficom.fi/en/communications/communications-networks/existing-radio-licenses-frequency-bands-2300-2320-mhz-and>



Thank you!

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