

Comparison of operators

STUDY OF LTE NETWORK SPEEDS



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Abstract

This study was performed in spring 2017 to measure the speeds of LTE networks (DNA, Elisa and Telia). Field studies were carried out in March in 35 towns/municipalities covering approximately 60 per cent of Finland's population. Measurements were also taken on stretches of road between these towns.

The LTE speeds were measured using similar LTE terminals (with a maximum data transfer rate of 300 Mbit/s) and unrestricted SIM cards in the downlink direction on all of the LTE networks simultaneously. Elisa's average speed of 41.26 Mbit/s in the downlink direction was the highest, Telia's rate of 36.59 Mbit/s was the second highest, and DNA's 35.88 Mbit/s was third.

The coverage of LTE technology has continued to expand for all operators. In addition, investments in LTE capacity (including Carrier Aggregation technology) have increased LTE network speeds. The results show that investments in mobile phone networks are continuing and operators are investing in constantly improving mobile broadband.

During the study, a measurement route of 5,183 km was followed to take in 35 towns in different parts of Finland, as well as a route of 1,916 km to take measurements on stretches of road between these towns. A total of approximately 1,000,000 downlink transfer rate samples were taken during the measurements, amounting to approximately 330,000 per operator.

General

This report presents the results of the study performed in March 2017 to measure the speeds of the LTE networks operated by DNA, Elisa and Telia.

During the project, field measurements were taken as follows:

- 35 of the 100 largest towns
- Stretches of road between the 35 towns

The selected localities, listed below, represent approximately 60 per cent of Finland's population.

| | | |
|-------------|--------------|-------------|
| Espoo | Kirkkonummi | Rauma |
| Helsinki | Kotka | Riihimäki |
| Hollola | Kouvola | Seinäjoki |
| Hyvinkää | Kuopio | Siilinjärvi |
| Hämeenlinna | Lahti | Tampere |
| Imatra | Lappeenranta | Turku |
| Joensuu | Lohja | Tuusula |
| Jyväskylä | Mikkeli | Vaasa |
| Järvenpää | Nurmijärvi | Vantaa |
| Kaarina | Pori | Varkaus |
| Kangasala | Porvoo | Ylöjärvi |
| Kerava | Raisio | |

Objective

The objective of the study was to determine the downlink data transfer rate that can be achieved on each operator's LTE network.

A drive test was conducted to determine the LTE speed by continuously transferring a large amount of data. Drive tests provide a more realistic representation of mobile broadband performance than spot measurements. The amount of data transferred also affects the results. Drive tests typically involve transferring a considerably larger amount of data than spot measurements, thereby better representing the varying characteristics of the radio channel. In addition, the drive test was entirely controlled: the devices and connection types (unrestricted LTE connection) were set up in the same way for all of the operators to minimise the impact of errors.

Localities

Measurements were taken in the 35 towns stated above. The measurement route in each locality consisted of the following:

- Central area: main streets
- Other areas: residential and industrial areas

The measurement group was not aware of the structures of each operator's network, and the measurement routes were chosen at random to ensure that the measured areas were covered to the maximum possible extent. The total length of the measurement routes followed in the towns was approximately 5,183 km.

A further 1,916 km of routes covered stretches of road between towns, with measurements taken on main roads following the shortest possible route between the towns.

The speed study was commissioned by Elisa and conducted by European Communications Engineering (ECE Oy), an independent expert company from Finland operating in the field of radio network design, training and development. Further information:
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Elisa: www.elisa.fi, +358 10 26000

Measured quantities and measurement system

Measured quantities

The quantity measured in the speed test was the data transfer rate – the number of bits received in a second (bit/s). The number of bits received was continuously measured and a total of approximately 1,000,000 samples were taken during the measurement period, amounting to approximately 330,000 per operator.

Measurement system

The Nemo Outdoor software was used to measure speeds.

The measurement system consisted of the following:

- Measurement software: Nemo Outdoor (x3, one for each operator)
- Terminal: Samsung Note 4 (x3, one for each operator)
- PC: HP Elitebook 8570w (x3, one for each operator)

The LTE speed was measured using a Samsung Note 4 terminal on each operator's LTE network only (the terminal was locked to the LTE service that can be used freely in accordance with the operator's parameters). The classification of the terminal used for the measurements enables a theoretical maximum speed of 300 Mbit/s to be achieved using current Carrier Aggregation (CA) technology. An unrestricted SIM card from each operator was used to access the LTE service.

The measurement involved transferring data in the downlink direction from the same server, which had sufficient connections to enable all of the operators' maximum speeds to be realised.

System for analysing measurement results

The ECE eEPOS™ system was used to analyse the measurement data.

Comparison bases

The speed results were compared by compiling the measured samples and calculating the average. This comparison was made for each operator's area of LTE coverage.

Deliverables

LTE data rate

Figure 1 shows the average LTE data rate in the downlink direction for each operator in its own areas of coverage.

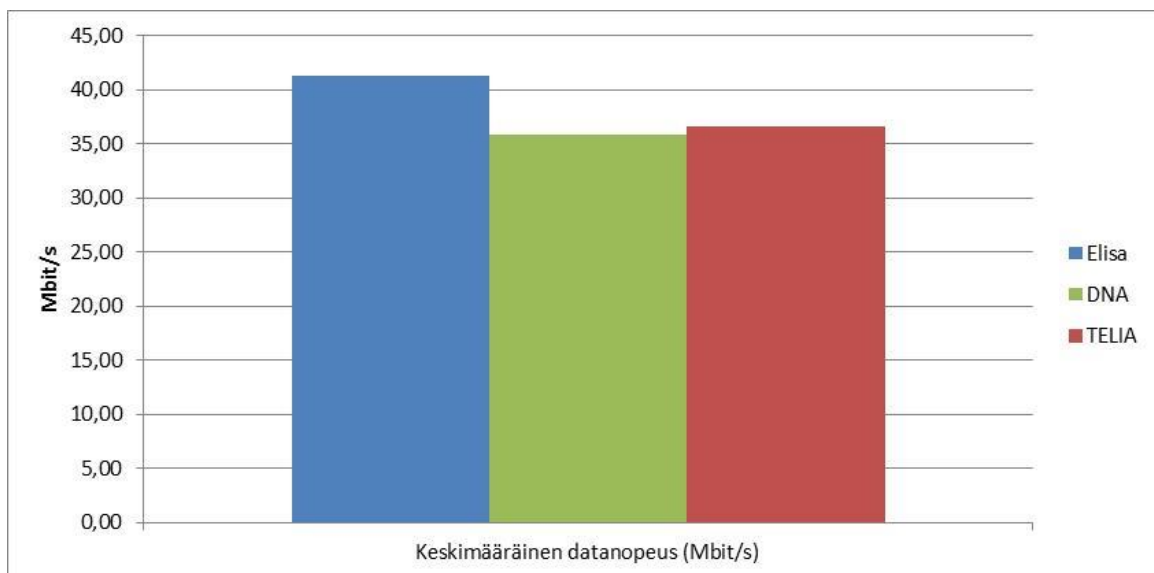


Figure 1. Average LTE data rate in the downlink direction in the 35 largest localities and stretches of road between them. The result of the operator that received the highest value has been scaled to 100 per cent.

Figure 1 shows that the average speed of Elisa's LTE service, 41.26 Mbit/s, is the highest when taking into account the 35 measured towns and stretches of road between them. Telia's result of 36.59 Mbit/s puts it second, and DNA is third with 35.88 Mbit/s.

Conclusions

Based on the results, it can be stated that Elisa has, on average, the fastest LTE service in the 35 measured towns and stretches of road between them, Telia is second and DNA is third.

In general terms, it can be stated that operators have continued to make major investments in maintaining and improving their LTE services.