# Elisa Carrier Services

Elisa Mobile Real Time

The Elisa Mobile Real Time service allows mobile operators to buy services enabling fast, reliable, real-time connections to a base station for eMBBapplications (enhanced Mobile Broadband). The service is suitable for cases where the customer is building their own base station network. The connection is implemented with Ethernet technology and optimised for L2 level data transfer. The access connection is implemented using fiber or radio link technology.

The Elisa Mobile Real Time service provides the mobile operator with an Ethernet connection established between the base station and the NNI (Network-to-Network-Interface) connection. The NNI connection consists of a NNI port and a possible fixed connection, and is priced separately. It is possible to route several connections from base stations to the NNI connection.
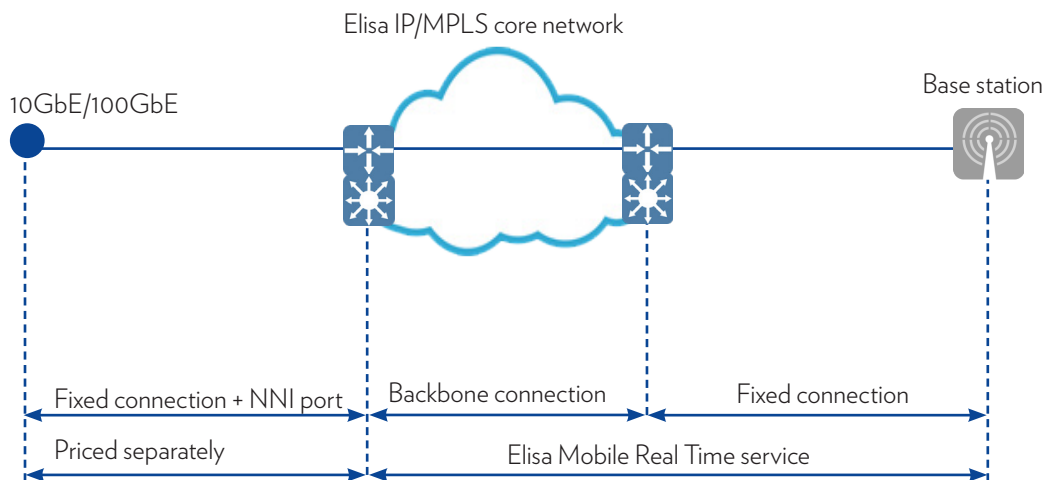
Ethernet connection

There is one (1) Ethernet connection. Its capacity is either 100 Mbit/s, 300 Mbit/s, 1 Gbit/s, 2 Gbit/s, 4 Gbit/s or 10 Gbit/s. The connection is compliant with IEEE 802.3-2002.

The default handover interface to the customer is

- Fast Ethernet 100Base-TX
- 1000Base-BX-D (optical single mode Tx1490 nm and Rx1310 nm, LC connector)
- 1000Base-LX (optical single mode, LC connector)
- 10GBase-BX-D (optical single mode, TX: 1270 nm and RX: 1330 nm, LC connector)
- 10GBase-LR (optical single mode, LC connector)

  Other interface separately on a case by case basis.

NNI connection

The Ethernet connection is routed to the 10 or 100 Gigabit Ethernet NNI connection (NNI port + possible fixed connection).
The NNI is compliant with IEEE 802.3-2002 regulations.

The default handover interface to the customer is:

- 10GBase-BX-D (optical single mode, TX: 1270 nm and RX: 1330 nm, LC connector)
- 10GBase-LR (optical single mode, LC connector)
- 100GBase-LR4 (optical single mode, LC connector)

For more information on NNI options and additional services (e.g redundant NNI service), see the separate NNI service description.The NNI connection is priced separately.

Frame size

The maximum frame size at the end of the base station (MTU) is 1648 bytes. The frame is a standard-compliant 802.1Q frame, including the CRC field.

In the NNI connection, the maximum frame size is 1652 bytes. A second Q heading has been added to the frame. The Q heading is used to identify the base station communicating with the NNI connection. The Q frame sent by the base station passes unchanged through the connection, including the 802.1p field and the VLAN identifier inside the Q heading.

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Synchronization

Phase synchronization is delivered using ITU-T G.8275.1 Precision Time Protocol (PTP).Frequency synchronization is delivered using ITU-T G.8262 SyncE (Synchronous Ethernet).Maximum phase error for eMBB traffic is 1000 ns relative to the common reference.
Parameters:

- PTP domain ID 24
- Multicast non forward

G.8275.1 and SyncE are only provided for the leased line access connection towards a base station. Synchronization is not provided for the NNI.

Traffic categories

By default, an autonegotiation function is used as a handshake procedure. Ethernet 802.1p CoS (Class of Service) support for CIR (Committed Information Rate) and PIR (Peak Information Rate) is implemented with three queues: Expedited Forwarding (EF), Assured Forwarding (AF) and Best Effort (BE).

Elisa Mobile Real Time 100M

Queue	CIR Mbps	PIR Mbps	802.1p
EF	15	15	5
AF	30	30	3
BE	0	100	0

Elisa Mobile Real Time 300M

Queue	CIR Mbps	PIR Mbps	802.1p
EF	30	30	5
AF	60	60	3
BE	0	300	0

Elisa Mobile Real Time 1G

Queue	CIR Mbps	PIR Mbps	802.1p
EF	30	30	5
AF	300	300	3
BE	0	1000	0

Elisa Mobile Real Time 2G

Queue	CIR Mbps	PIR Mbps	802.1p
EF	60	60	5
AF	500	500	3
BE	0	2000	0

Elisa Mobile Real Time 4G

Queue	CIR Mbps	PIR Mbps	802.1p
EF	60	60	5
AF	500	500	3
BE	0	4000	0

Elisa Mobile Real Time 10G

Queue	CIR Mbps	PIR Mbps	802.1p
EF	60	60	5
AF	500	500	3
BE	0	10000	0

Delay values

The measuring period is 15 minutes, and an average value is taken of that. The frame size of data packages is 1000 bytes.

Connection implemented with fiber pair or equivalent (e.g. xWDM)

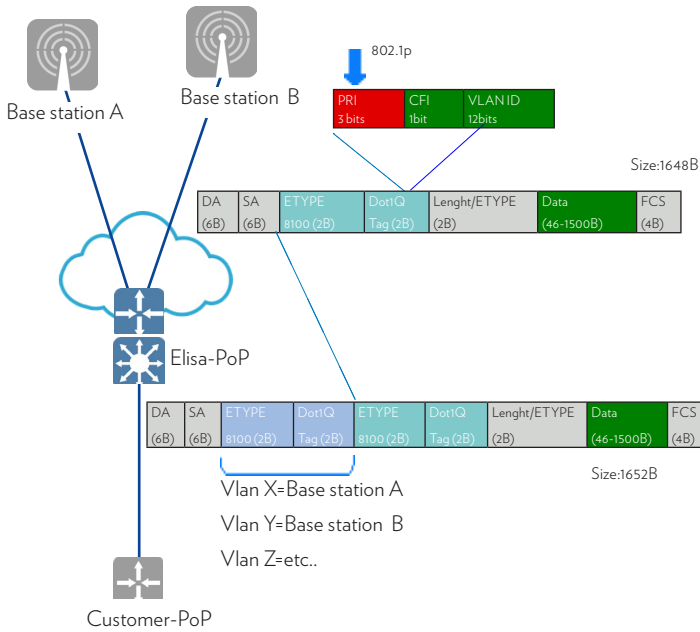| Queue	Typical delay	Delay variation (JITTER)	Packet loss
EF	≤ 7	≤ 3	<4E-8
AF	≤ 13	≤ 8	<4E-8
BE	≤ 28	Not defined	≤ 1E-3

The technical implementation includes the following:

- Given values for delays and packet loss in one direction from connection to connection
- Excess traffic will be dropped
- When using radio link connections, different weather conditions and other external factors may momentarily affect the usability of the connection, in which case the above quality criteria may not be temporarily met
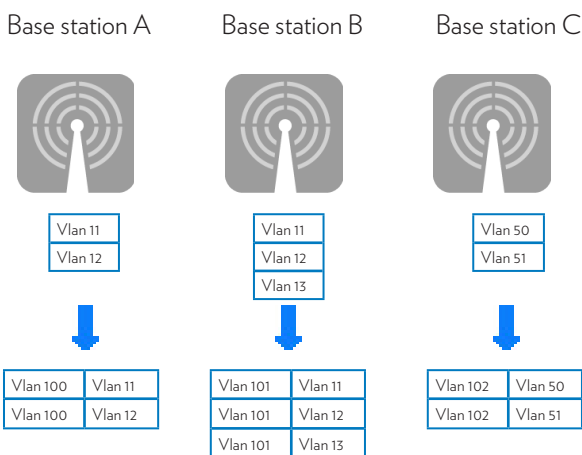
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Frame structures

The picture below shows the frame structure in the NNI connection (QinQ) and the base station connection.

Base station A
Base station B

802.1p

| PRI 3 bits | CFI 1bit | VLAN ID 12bits |

Size:1648B

| DA (6B) | SA (6B) | ETYPE 8100 (2B) | Dot1Q Tag (2B) | Lenght/ETYPE (2B) | Data (46-1500B) | FCS (4B) |

Elisa-PoP

| DA (6B) | SA (6B) | ETYPE 8100 (2B) | Dot1Q Tag (2B) | ETYPE 8100 (2B) | Dot1Q Tag (2B) | Lenght/ETYPE (2B) | Data (46-1500B) | FCS (4B) |

Size:1652B

Vlan X=Base station A
Vlan Y=Base station B
Vlan Z=etc..

Customer-PoP

Example of VLAN identifiers inside Q headers:
Base station A sends traffic with VLAN identifiers 11 and 12. Base station B sends with VLAN identifiers 11, 12 and 13. Base station C sends with VLAN identifiers 50 and 51

Base station A   Base station B   Base station C

Vlan 11		Vlan 11		Vlan 50
Vlan 12		Vlan 12		Vlan 51
		Vlan 13		

Vlan 100	Vlan 11		Vlan 101	Vlan 11		Vlan 102	Vlan 50
Vlan 100	Vlan 12		Vlan 101	Vlan 12		Vlan 102	Vlan 51
			Vlan 101	Vlan 13			

In the NNI, the frame sent by the base station is received with an additional Q header, which means that the frame has two Q headers.

The outer Q frame identifies the base station and the inner one is the Q header originally sent by the base station.

In the hub, base station A receives a VLAN value of 100 in the outer Q header, base station B receives a VLAN identifier value of 101, and base station C gets an identifier with the value 102.

Content of the service

- OSI Layer 2 level connection
- Includes one (1) Ethernet connection
- Base station connection with optional capacity:
    - 100 Mbit/s, 300 Mbit/s, 1 Gbit/s, 2 Gbit/s, 4 Gbit/s, 10 Gbit/s
- Traffic category: Mobile Real Time
- SLA basic service level P0V8h
    - service time: week: Mon - Fri 8 am– 4 pm
    - Response time target: 8 h service time
    - Repair time target: 24 h service time
- NNI connection 10Gbit/s or 100 Gbit/s
- NNI connections are priced separately (NNI port + possible fixed connection)
- The target delivery time is four (4) weeks from the accepted order in the on-net area.

Additional services

Connection-specific Elisa Mobile Real Time additional services:

- SLA special service levels
- NNI backup service

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SLA special service levels

The service always includes at least the Basic service level. Special services levels (SLA) can be selected from the table:

Service level category	Service hours	Response time	Repair time
P1K6h	P1: week days: Mon–Fri 7 am–6 pm	30 min	6 h
P2K6h	P2: week days. Mon–Fri 7 am–9 pm and Sat 8 am-6 pm	30 min	6 h
P25K6h	P25: Mon-Sun 7 am - 11 pm	30 min	6 h
P3K6h	P3: 24h/365d	30 min	6 h

Service hours means the time when fault limitation and repair measures will be carried out.

Response time is the time within which actions resulting from a service request will be started.

Repair time refers to the time within which a fault has been repaired.

The content and application of the service levels and additional SLA services are described in more detail in the Elisa SLA service description.

Elisa reserves the right to restrict the number of service levels offered in sites where restrictions are imposed by:

• geographical distances and/or the quality of the connection implemented using copper cable
• the limited level of service for the access connection provided by a third party (a local network operator)

NNI backup service

With the Elisa Ethernet NNI backup service, customers can secure the interface (NNI) between their network and Elisa's MPLS network, thus increasing the availability of Elisa Mobile Real Time base station connections they have purchased from Elisa's network.

The verification mechanism is based on the "Multi Chassis Link Aggregation Group" technology (MC-LAG) and the use of the "Link Aggregation Control" protocol (LACP) between the NNI ports. In NNI backup service, the virtual connections of Elisa Mobile Real Time base station connections are transported through Elisa's backbone network to two separate NNI's. The service is described in more detail in a separate Elisa NNI service description.

Order and delivery time

Orders are placed via the Elisa Carrier Services Online order and delivery system. The target delivery time is four weeks from the approved order confirmation to ready Elisa network. The delivery time is confirmed in the order confirmation. Elisa and the customer may also agree upon another delivery time.

Elisa network maintenance and modification work hours

Elisa network service time windows for planned network maintenance and modification work are 0:30–5:30 am on every second and fourth Wednesday of the month. Elisa reserves the right to also perform network maintenance and modification during other hours. The goal is to always inform customers of maintenance and modification work and the related impact in advance and to minimize any resulting disruptions and/or breaks in the services.

User support

Elisa's Service Desk provides assistance with technical issues and service disruptions.

Fault reports are made through the Elisa Carrier Services Online order and delivery system or by calling the 24-hour Service Desk on +358 10 26 096.

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Data protection

Personal data is processed in the service, such as installation address and contact details for the onsite persons. The personal data is processed for service implementation. Concerning the personal data processed in the service, the telecommunications operator is the personal data controller stated in the data protection legislation and Elisa is the processor. Personal data processed in the service can be processed outside the EU/EEA area. Elisa ensures that in a country where personal data is processed, the level of data protection is adequate and in accordance with the European Commission's decision, or alternatively, that the transfer is subject to a legally appropriate safeguard measure such as a data transfer agreement in accordance with the EU standard contractual clauses on the transfer of personal data outside the EEA. Elisa has the right to use subcontractors in the provision of services and in the processing of personal data.

Terms and conditions

The service is governed by Elisa's General Terms for Operator Products.