

Introduction to Mobile Phone Telematics Protocol

for Benefon GSM/GPS products

Version 2.1



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1. INTRODUCTION

MPTP (Mobile Phone Telematics Protocol) is a protocol developed by Benefon Corp. It is a key for building professional and consumer telematics solutions in GSM networks. MPTP provides sophisticated telematics commands for service integrators and providers to build and provide various applications utilising location information.

MPTP enables, for example, the sending of location, tracking and route messages between service centers and Benefon MPTP enabled terminals. It uses SMS as bearer, and is fast and easy to implement in service centers.

Full description of the commands are removed from this document. Complete MPTP document as well as referenced documents are available from Benefon after purchasing Developers License Agreement.

Application examples

- navigational directions
- geomessaging and mobile communities
- yellow pages with turn-by-turn instructions
- points of interest
- location-sensitive sponsored content
- fleet management
- staff management
- personal safety
- security
- healthcare
- sports and lifestyle

What about privacy?

There is general concern about privacy issues with the new location-based services. Can anybody track my location through MPTP?

Benefon wireless instruments targeted for consumer markets require the consent of the user for his position to be revealed to other persons or to services. Products targeted at vertical business or organisational applications may be configured to authorize the service center to track the device. This is essential for e.g. providing back-up safety to lone workers or tracking valuable assets.

For further information

If you have any questions, please pay a visit to our web pages. You will also find our contact information there

<http://www.benefon.com>

1.1. References

This document is based on and references the following documentation:

1. [GSM 7-bit default alphabet table.pdf](#)
2. [MPTP AGPS messages.pdf](#)
3. [Benefon message encryption system.pdf](#)
4. <http://www.funet.fi/pub/doc/rfc/rfc1521.txt>
5. [MPTP icon symbols and codes.pdf](#)
6. [03042501-0005-01 Specification.pdf](#)
7. [Table of MPTP commands.pdf](#)
8. [Table of CNF setting IDs.pdf](#)
9. Trace log documentation
10. Event log documentation
11. [NMEA output messages.pdf](#)

Most of these documents can be found from our web pages <http://www.benefon.com> in developers section.

2. OVERVIEW OF THE SYSTEM

MPTP messaging takes place in the GSM network using specially formatted SMS messages. This chapter describes the roles of the actors in such MPTP messaging exchange and gives an overview of some typical scenarios involving telematics messaging.

A more detailed and technical description of the format, structure and use of MPTP commands is given in subsequent chapters.

2.1. Actors

MPTP messaging always takes place between two parties. The typical actors in such exchange are a Control Centre and a Mobile Telematics Terminal.

2.1.1. Control Centre

A Control Centre has capabilities for monitoring and controlling one or more Mobile Telematics Terminals. Such remote controlling functionality includes requesting and receiving position updates from terminals, creating navigation objects such as waypoints and routes on them, configuring the terminals' setup, and receiving and distributing status information.

A Control Centre is typically a PC equipped with hardware and software (such as Benefon In Charge) for sending, receiving and processing MPTP messages. An MPTP-enabled mobile instrument such as Benefon Esc! also features functions for acting as a Control Centre with less extensive capabilities.

In subsequent chapters, the Control Centre will often be referred to as **CC**.

2.1.2. Mobile Telematics Terminal

A Mobile Telematics Terminal is a positioning-capable mobile instrument with functionality for receiving and responding to MPTP messages sent by the Control Centre. Its typical uses include sending position information (e.g. when it is tracked) and sending status messages.

Typical Mobile Telematics Terminals include professional work management instruments such as Benefon Track, navigation instruments such as Benefon Esc!, and asset tracking instruments such as Benefon TrackKeeper.

Depending on situation, a Mobile Telematics Terminal may sometimes also act as a Control Centre. An example of such a case is when a Benefon Esc! is used for both tracking other terminals (in which case it acts as a Control Centre) as well as responding to requests from them (in which case it acts as a Mobile Telematics Terminal).

In subsequent chapters, the Mobile Telematics Terminal will often be referred to as **MTT**.

2.1.3. Authorisation and access rights

It is desirable to limit the parties from which MPTP messages used for controlling and monitoring a Mobile Telematics Terminal are allowed, not only to protect the user's privacy and to ensure security of stored data, but also to limit the number of messages sent.

Track and Esc! use a somewhat different system for controlling MPTP messaging.

Benefon Track

In the Track line of products, the setting **Service center number** defines one number which has full rights for remotely controlling and configuring all features of the instrument. All requests sent from this number are always responded to immediately.

The setting **Authorization** determines whether the list of **Authorized numbers** should be used for deciding whether a request should be processed and responded to. Please note that this also applies to configuration request commands.

- If **Authorization** is enabled:
 - All requests from authorized numbers are automatically processed. Any responses are sent to the number from which the request came.
 - All requests from numbers not listed as authorized are either disregarded altogether or require the user to accept their processing by confirming a notification; the exact actions taken depend on the command in question. Any responses are sent to the number from which the request came.
- If **Authorization** is disabled:
 - All requests are automatically processed. If the **Service center number** has been defined, any responses are always sent to that number; otherwise, they are sent to the number from which the request came.

The phone numbers defined as **Emergency center numbers** (Telematics settings > Emergency settings > Emergency center numbers) are treated as authorized numbers. However, please note that some products such as Benefon Seraph do not treat the emergency center numbers as authorized except during emergency situations.

Benefon Esc!

In the Esc! line of products, the Friend Find or Commander application can be used for marking the Friend Find entries as authorized or unauthorized.

- All requests from authorized Friend Find entries are automatically processed. Any responses are sent to the number from which the request came.
- All requests from unauthorized Friend Find entries require the user to accept their processing by confirming a notification. Any responses are sent to the number from which the request came.

Esc! does not support reception of configuration request commands.

2.2. Applications

MPTP provides a wide set of commands for realising the application examples listed in chapter 1. The commands can be categorised according to their type as is done below; this categorisation will be used throughout this document. It should be noted that all report commands typically contain the sending instrument's position information.

2.2.1. Position reporting

The simplest method of sharing the position information of a Mobile Telematics Terminal is by using positioning commands. Typical positioning scenarios are as follows:

1. A Control Centre wants to know the position of a Mobile Telematics Terminal.

Examples: (1) A parent wants to know the whereabouts of her child. (2) The shift manager of a taxi company wants to know the position of a car in the field.

The centre sends a **position request** MPTP command to the terminal. The terminal then responds by sending a **position report** MPTP command which contains its position information.

2. A Mobile Telematics Terminal wants to inform a Control Centre of its position.

Example: A security guard informs the alarm centre of his position before entering a dangerous area.

The terminal sends a **position report** MPTP command to the centre.

3. A Control Centre wants to know where a Mobile Telematics Terminal has been.

Examples: (1) A probation officer wants to know where the offender has been moving lately. (2) A hunter wants to know where his dog has been moving while chasing a deer.

The centre sends a **position history request** MPTP command to the terminal. The terminal then responds by sending a **position history report** MPTP command, which contains the requested number of known positions with times.

The MPTP commands, which can be used for realisation of these scenarios, are described in full MPTP document. **Error! Reference source not found..**

2.2.2. Tracking

The term *tracking* means a function, which enables monitoring a target's position and possible movement. The tracked Mobile Telematics Terminal will automatically send a series of MPTP messages of its position to the Control Centre as defined by the tracking process. Typical tracking scenarios are as follows:

1. A Control Centre wants to follow the movements of a Mobile Telematics Terminal.

Examples: (1) A delivery company wants to monitor the movements of a valuable transport. (2) A hunter wants to know how his dog moves in the forest.

The centre sends a **tracking request** MPTP command to the terminal, requesting the terminal to send **tracking report** MPTP commands at regular intervals. The centre can specify the number of reports it wants to be sent, or it can set a duration or end time for the tracking process. Setting timing for a single report is also possible.

2. A Control Centre wants to be informed when a Mobile Telematics Terminal enters or exits an area.

Examples: (1) An electricity company wants to know when a team of electricians arrives at a storm damage area and when it departs from there. (2) A parent wants to know when her child crosses the border of a permitted area.

The centre sends a **tracking request** MPTP command requesting the terminal to send one or more **tracking report** MPTP commands when it enters and/or exits an area. The centre can specify whether it wants to receive just one report, or get reports at regular intervals while the target is inside or outside the area.

3. A Control Centre wants to be informed when the speed of a Mobile Telematics Terminal goes over or under a limit.

Example: A delivery company wants to know when a valuable transport is on the move or when it stops.

The centre sends a **tracking request** MPTP command requesting the terminal to send one or more **tracking report** MPTP commands when its speed goes over or under the specified limit.

4. A Mobile Telematics Terminal wants to inform a Control Centre of its movements.

Example: A social worker wants to keep his shift manager knowledgeable about his movements when entering a dangerous area.

The terminal sends a **tracking request** MPTP command to the centre, requesting its permission to start sending tracking reports. The centre can accept or reject the request by sending an **acknowledgement** MPTP command. If the request was accepted, the terminal will start sending **tracking report** MPTP commands as it declared in its request.

The MPTP commands, which can be used for realisation of these scenarios, are described in full MPTP document. **Error! Reference source not found.** Entering and exiting an area can also be monitored by using the travel mark commands; cf. below.

2.2.3. Condition checks

The term *condition check* means a function where a Control Centre monitors a Mobile Telematics Terminal's condition by means of queries to which the user of the monitored terminal must react. Typical condition check scenarios are as follows:

1. A Control Centre wants to monitor the condition of a Mobile Telematics Terminal.

Example: The alarm centre wants to be certain that a guard entering a dangerous area is ok and stays that way; if the guard fails to react to a query a report will be sent to the alarm centre.

The centre sends a **condition check request** MPTP command to the terminal, requesting the terminal to show a condition check query to its user at regular intervals. The user must react to the query within a specified time limit, either by entering a password or by simply pressing a key, and the terminal may send a **condition check report** about the user's ability or failure to do so. The centre can specify the number of queries it wants to be made. Alternatively, it can set duration or end time for the condition check process.

2. A Mobile Telematics Terminal wants to inform a Control Centre of its condition.

Example: A social worker wants to make sure that he gets help even if he suddenly becomes unable to use his phone; failing to react to a query will cause a report to be sent to the shift manager.

The terminal sends a **condition check request** MPTP command to the centre, requesting its permission to start sending condition check reports. The centre can accept or reject the request by sending an **acknowledgement** MPTP command. If the request was accepted, the

terminal will start showing queries to its user. **Condition check report** MPTP commands will then be sent as the declared in the request.

The MPTP commands, which can be used for realisation of these scenarios, are described in full MPTP document. **Error! Reference source not found..**

2.2.4. Emergency cycle

The term *emergency cycle* refers to an automated sequence of actions taken when the end user has pressed the emergency key. External triggers such as a verticality sensor can also start the cycle. The action sequence consists of making emergency calls and sending emergency messages containing position information.

Examples: (1) An elderly gentleman falls and injures himself; pressing the emergency key causes sending an emergency report to his daughter and sets up a call. (2) A police officer is shot and down; the verticality sensor starts the emergency cycle, which reports his position to the alarm centre and sets up a call so that the centre can listen to the situation.

The emergency cycle functionality is started when the user of a Mobile Telematics Terminal presses the emergency key or when an external event causes it. The terminal will then make a series of phone calls to predefined phone numbers. It will also send **emergency report** MPTP messages which contain the position of the terminal. The Control Centre receiving such a report may respond by sending an **emergency confirmation** MPTP command to let the user of the terminal know that the report has been processed. The emergency cycle can also be configured so that it does not stop until **emergency confirmation** MPTP command has been received.

The MPTP commands used for the emergency cycle are described in full MPTP document. **Error! Reference source not found..**

2.2.5. Status and information messages

Status and information commands are used for reporting a Mobile Telematics Terminal's or its user's status information to a Control Centre, or to provide instructions or other information to a terminal from a Control Centre. The following kinds of status and information commands are available:

1. The user of a Mobile Telematics Terminal wants to inform a Control Centre about his status.

Example: (1) A police officer wants to inform the alarm centre that a dangerous situation is over. (2) A courier wants to inform the dispatch centre that she has delivered a parcel.

The terminal sends a **status report** MPTP command to the centre. In addition to the sender's position, a status report typically contains a status code and some text.

2. The user of a Mobile Telematics Terminal wants to inform a Control Centre that he is available for work.

Example: A courier wants to inform the dispatch centre that she is ready to take the first task; in case the terminals are shared by multiple couriers, the centre also finds out which terminal the courier is using today.

The terminal sends a **login report** MPTP command to the centre. In addition to the sender's position, the login report contains the user's ID code and possibly some text.

3. The user of a Mobile Telematics Terminal wants to inform a Control Centre that he is no longer available for work.

Example: A courier wants to inform the dispatch centre that she is no longer available for new tasks; in case the terminals are shared by multiple couriers, the centre also finds out which terminal the courier was using today.

The terminal sends a **logout report** MPTP command to the centre. In addition to the sender's position, the login report contains the user's ID code and possibly some text.

4. The user of a Mobile Telematics Terminal wants to request assistance from a Control Centre.

Example: A mobilist has had a breakdown; he requests position-based help from the road service by sending an assistance request command.

The terminal sends an **assistance request** MPTP message to the Control Centre. Alternatively or in addition to the message, a voice call can be initiated. (Please note that requesting navigational instructions and points of interest can often be more efficiently done by using the travel mark commands; cf. below.)

5. A condition requiring information about a Mobile Telematics Terminal to be sent to a Control Centre has been met.

Example: (1) A black box attached to a truck reports the alarm centre when the temperature of its cargo rises above +7°C (45°F). (2) The probation officer of a known stalker wants to know when the phone carried by the offender is connected to a home station.

The terminal automatically sends a **status report** or a **device information report** MPTP command to the centre. In addition to the terminal's position, the report contains information about the event which caused the sending.

6. The Control Centre needs to be notified when the SIM card in a Mobile Telematics Terminal is changed.

Example: The alarm centre wants to keep track of the current phone number of each disabled person subscribed to a safety service.

The terminal automatically sends a **new SIM card report** MPTP command to the centre when it detects a new SIM card having been inserted. The centre then responds by sending a **new SIM card acknowledgement** MPTP command to acknowledge the new card.

7. The Control Centre needs version information about a Mobile Telematics Terminal.

Example: The alarm centre needs to know which telematics features a black box in a truck supports.

The centre sends a **SW and IMEI request** MPTP command to the terminal. The terminal then responds by sending a **SW and IMEI report** MPTP command which contains its software version information as well as the phone's IMEI code.

8. The Control Centre needs to provide instant textual instructions to the user of a Mobile Telematics Terminal.

Example: (1) A security guard needs the entry code to a building. (2) The probation officer wants to ask the offender to connect the phone to a docking station.

The centre sends an **on-screen message** MPTP command to the terminal. The terminal displays the message on its display at once, and the user needs to confirm it.

The MPTP commands used for status reporting are described in full MPTP document. **Error! Reference source not found..**

2.2.6. Travel marks

The term *travel mark* refers to an object used for navigation. Typical travel marks include the following:

1. Waypoints (also known as *points of interest*)

A waypoint is a navigational object described by a number of properties, typically at least including name and coordinates. Additional properties such as a symbol to be used for the waypoint on a map can also be defined.

Waypoints are typically used for marking positions and navigating to them.

2. Waypoint groups

A waypoint group is group that is formed of multiple waypoints and described by a number of properties, typically at least including group type and group name. Additional properties such as an expiration date can also be defined.

Waypoint groups are typically used for forming polygonal areas and tracking multiple waypoints.

3. Routes

A route is a navigational object consisting of an ordered list of two or more waypoints. Additional properties such as name can also be defined. A waypoint used on a route is referred to as a *route point*.

Routes are typically navigated in order from start to end or vice versa.

In addition to purely navigational purposes, waypoints and routes can also be used for tracking a Mobile Telematics Terminal's arrival to or departure from them.

Typical scenarios involving travel marks are as follows:

1. A Mobile Telematics Terminal wants to request a Control Centre to send waypoints or routes.

Examples: (1) A mobilist needs to locate the closest gas stations. (2) A security guard needs to find his way to a target.

The terminal sends a **waypoint request** or a **route request** MPTP command to the centre, requesting it to send one or more waypoints or routes. Keywords may be included in the request as needed. The centre responds by sending one or more **waypoint creation** or **route creation** MPTP commands.

Commercial services can be created on this premise, but it can also be used for providing on-demand position information to employees of a company.

2. A Control Centre sends waypoints or routes to a Mobile Telematics Terminal.

Examples: (1) The dispatch centre sends the position of the next pick-up address to a courier. (2) A hiker sends a route to a beautiful site to her friend.

A centre sends a **waypoint creation** or **route creation** MPTP command to a terminal.

3. A Control Centre wants to be informed of a Mobile Telematics Terminal's arrival to and/or departure from waypoints.

Examples: (1) The shift manager wants to know when a social worker arrives to or departs from known dangerous checkpoints. (2) The probation officer of a known stalker wants to know if the offender goes to forbidden areas.

The centre sends a **waypoint manipulation** MPTP command requesting the terminal to activate tracking for one or more waypoints stored on it. The terminal will then send **waypoint tracking report** MPTP commands when it arrives to or departs from the tracked waypoints.

The terminal's arrival to the waypoints of a route, in their correct order, can also be monitored. In this case, the centre sends a **route manipulation** MPTP command requesting the terminal to activate tracking of the route stored on it. The terminal will then send **route tracking report** MPTP commands as it arrives to the route points.

4. A Control Centre wants to create a polygonal area which afterwards can be used for polygonal area tracking.

Examples: (1) Certain truck is not supposed to leave the country. The owner of the truck creates a polygonal area which forms the borders of the country. The area can then later be tracked if needed.

The centre sends a **waypoint group manipulation** MPTP command requesting the terminal to create a waypoint group of type polygonal area. The terminal will then send **waypoint group manipulation report** MPTP command which gives the group id of the created group. The centre then sends **waypoint manipulation** MPTP command requesting the terminal to add waypoints to the created group. After adding the waypoints to the group, **tracking request** can be used to activate the tracking of the polygonal area defined by the waypoint group.

The MPTP commands, which can be used for realisation of these scenarios, are described in full MPTP document. **Error! Reference source not found.** Entering and exiting a single area can also be monitored by using tracking commands; cf. above.

2.2.7. Memory logs

The term *memory log* refers to different kinds of logs the terminal keeps about movement or different events.

Typical scenarios involving memory logs are as follows:

1. A Control centre wants to request a Mobile telematics terminal to send it's trace log.

Examples: (1) A probation officer needs to know where the offender has been moving. (2) A hunter wants to know where his dog has been moving during the day of hunting.

The control centre sends a **trace log management request** MPTP command to the terminal, requesting it to send its trace log via data call. The terminal responds by sending the trace log file over data call.

2. A Control Centre wants to request a Mobile telematics terminal to send its event log.

Examples: (1) The car rental centre monitors the starting and switching of the engine of the car. The starting and switching of events are saved into the event log along with the position and timestamp. At times the car rental centre requests for the event log to get to now where the cars have been.

The control centre sends a **event log management request** MPTP command to the terminal, requesting it to send its event log via data call. The terminal responds by sending the event log file over data call.

3. A Control Centre wants to know the odometer value of the terminal.

Examples: (1) The hunter wants to know many kilometers the dog has run while they were hunting.

The centre sends a **movement record request** MPTP command requesting the terminal to send its odometer value. The terminal will then send **movement record report** MPTP command to inform the control centre about the current odometer value.

The MPTP commands, which can be used for realisation of these scenarios, are described in full MPTP document. **Error! Reference source not found..**

2.2.8. Device configuring

The term *Device configuring* refers to changing or requesting the settings of a Mobile Telematics Terminal by use of an MPTP command sent by a Control Centre.

Typical scenarios involving device configuring are as follows:

1. A Control Centre wants to change the settings of the Mobile Telematics Terminal.

Examples: (1) The alarm centre wants to start using the message encryption system in the guards' terminals (2) The emergency centre operator wants to modify the list of emergency calls which will be made when user presses the emergency key of his terminal; rather than have the user reprogram the terminal, the operator sends a configuration command which does the job.

The Control Centre sends a **persistent settings configuring request** MPTP command requesting the terminal to modify its settings accordingly.

2. A Control Centre wants to request the settings of the Mobile Telematics Terminal.

Examples: (1) The alarm centre wants to check what is the default location request action used in the guards' terminals. (2) The emergency centre operator wants check the list of emergency calls which will be made when user presses the emergency key of his terminal.

The Control Centre sends a **persistent settings request** MPTP command requesting the terminal to send its settings. The terminal then sends the **persistent settings report** containing the requested settings values.

3. A Control Centre wants to activate the telematics services of the Mobile Telematics Terminal.

Examples: (1) The customer of the emergency services has paid for the service and wants to start using the service. The emergency centre operator activates the telematics services of the customer's terminal after the customer has paid for the service. After that the emergency cycle feature and rest of the telematics services of the terminal can be used.

The Control Centre sends a **activation of telematics services request** MPTP command requesting the terminal to activate the telematics services. If activation was successful the terminal then sends the **activation of telematics services report** to the Control Centre. The report contains the IMEI code and the User id of the terminal.

4. A Control Centre wants to change the message encryption key of the Mobile Telematics Terminal.

(1) The alarm centre wants to change the message encryption key used in the guards' terminals.

The Control Centre sends two **message encryption key setup request** MPTP commands requesting the terminal to change the message encryption key it uses.

The MPTP commands used for remote configuration are described in full MPTP document. **Error! Reference source not found..**

2.2.9. I/O pin control

The term *I/O pin control* refers to changing or reading the states of a Mobile Telematics Terminals I/O pins by use of an MPTP command sent by a Control Centre.

Typical scenarios involving I/O pin control messages are as follows:

1. A Control Centre wants to change the state of a digital output pin of the Mobile Telematics Terminal.

Examples: (1) The alarm centre wants to switch off the burglar alarm. (2) The alarm centre wants to switch on the burglar alarm.

The Control Center sends a **digital output pin control** message to the Mobile Telematics Terminal. The terminal then changes the state of the pin which was requested and sends **digital output pin control report** to Control Centre if needed.

2. A Control Centre wants to check the state or level of the Mobile Telematics Terminal I/O pin.

Examples: (1) The control centre wants to check the current temperature of the refrigerator truck. (2) The control centre wants to check the current gas level of the refrigerator truck.

The centre sends a **I/O pin request** to the terminal. The terminal will then send a I/O pin report which contains the requested information.

The MPTP commands used for controlling I/O pins are described in full MPTP document. **Error! Reference source not found..**

2.2.10. Generic response messages

The instrument receiving an MPTP command may respond by sending a command to acknowledge the reception.

Typical scenarios involving generic response messages are as follows:

3. A Mobile Telematics Terminal wants to activate a process (e.g. a tracking process, a condition check process or a route tracking process) but needs the permission of the Control Centre.

The terminal sends an activation request (e.g. a **tracking request** or a **condition check request**) to the centre. The centre can respond by sending an **acknowledgement** MPTP command indicating acceptance or rejection of the request.

4. A Control Centre sends a trace log management request to a Mobile Telematics Terminal for downloading the trace log and expects to receive information about errors, if any.

The centre sends a request (e.g. a **trace log management request** command) to the terminal. If the downloading of the trace fails for some reason, the terminal responds by sending an **error report** MPTP command indicating the cause of the failure.

Some terminals may be configured to report successful processing of a request as well. The **acknowledgement** MPTP command is used for this purpose.

The MPTP commands used for generic response messages are described in full MPTP document. **Error! Reference source not found..**

3. MESSAGE CONSTRUCTION AND INTERPRETATION.

This chapter describes the construction, fields and interpretation of any MPTP message. Full description is available in Benefon Developer License program.

As mentioned earlier, MPTP messages are sent between parties as specially formatted SMS messages. The standard 7-bit GSM character set is used (cf. [GSM 7-bit default alphabet table.pdf](#)).

Most MPTP messages are sent in a semi-readable ASCII format and can thus be received and read using any SMS enabled mobile phone. However, manually interpreting the data content of an MPTP message is rather tedious, so the receiving instrument should be equipped with software for reacting to the messages and their data content appropriately.

Some of the messages are partly binary and Base64 encoded so that more data can be fitted into one message.

Unlike other MPTP messages, AGPS (Assisted GPS) messages are always sent in unreadable binary format. The instrument receiving such a message always needs to have suitable software for interpreting them properly. Binary AGPS messages are treated in [MPTP AGPS messages.pdf](#).

Different chapters are; Common fields, Reading an MPTP command, Reassembling a received MPTP command, Encryption, Transliteration, Base64 encoding, Table of MPTP commands,

4. MPTP COMMANDS

This chapter lists each MPTP command, categorized according to their usage. For each command, the following information is given:

- Roles and purpose:
First, the roles of the sender and the recipient of the command are given. **CC** → **MTT** indicates that the role of the sender is Control Centre while that of the recipient is Mobile Telematics Terminal, and vice versa.
A brief textual description of the purpose of the command follows the role information.
- Supported Benefon instruments and software versions:
For each Benefon instrument and respective software version, support for sending and/or reception of the command is indicated.
- Actions on sending and reception:
The actions of the instrument on sending and reception of the command are given individually for each Benefon instrument.
- Command format:
The format of each command is listed as a table, as described in full MPTP document. **Error! Reference source not found.**, with sample values for each field in the command. The table is followed by individual descriptions for each field.

4.1. Position reporting commands

Position request (?LOC)
 Position report (!LOC)
 Manual position report (!POS)
 Network measurement request (?NMR)
 Network measurement report (!NMR)
 GPS position and network measurement request (?GNR)
 GPS position and network measurement report (!GNR)
 Position history request (?HIS)
 Position history report (!HIS)

4.2. Tracking commands

4.2.1. Tracking requests from Control Centre

Simple tracking request: interval, minutes (?TRC)
 Simple tracking request: interval, seconds (?TRS)
 Simple tracking request: stopping interval tracking (?STO)
 Complex tracking request (?TRG)
 Trigger type 0: area tracking

Trigger type 1: stopping at report limit
Trigger type 2: stopping at time limit
Trigger type 3: stopping at date and time
Trigger type 4: speed tracking
Trigger type 5: report at date and time
Trigger type 6: polygonal area tracking
Trigger type 7: endless tracking
Trigger type 8: real-time tracking, stopping at date and time
Deactivating complex tracking
Economy tracking request (?TRP)

4.2.2. Tracking requests from Mobile Telematics Terminal (!TRI)

Tracking activation permission request
Tracking deactivation permission request

4.2.3. Tracking reports

Simple report: interval tracking, minutes (!TRC)
Simple report: interval tracking, seconds (!TRS)
Complex report: tracking triggers (!TRG)
Economy tracking report: triggers (!TRP)

4.3. Condition check commands

Condition check requests from Control Centre (?CON)
Trigger type 0: endless queries
Trigger type 1: stopping at query limit
Trigger type 2: stopping at time limit
Trigger type 3: stopping at date and time
Deactivating condition check
Condition check requests from Mobile Telematics Terminal (!CND)
Condition check activation permission request
Condition check deactivation permission request
Condition check report (!CIN).

4.4. Emergency cycle commands

Emergency report with text (!EMG)
Emergency report with network measurement data (!EGN)
Emergency confirmation (?EGN)

4.5. Status and information commands

Status report (!STA)
Login report (!IN)
Logout report (!OUT)
Assistance request (!ASS)
Device information report (!INF)
New SIM card report (!SIM)
New SIM card confirmation (?SIM)
SW version and IMEI request (?SIR)
SW version and IMEI report (!SIR)

On-screen message (?OSM)
 General information request (?GIM)
 General information report (!GIM)

4.6. Travel mark commands

Waypoints

Waypoint request (!RWP)
 Non-referable waypoint creation (?SWP)
 Referable waypoint creation (?WPC)
 Sub-type 0: coordinates & IDs
 Sub-type 1: coordinates, tracking radii & IDs
 Sub-type 2: all properties
 Referable waypoint manipulation (?WPT)
 Waypoint tracking report (!WPA)

Waypoint groups

Waypoint group manipulation (?GMN)
 Action type 0: create
 Action type 1: delete
 Action type 2: empty
 Action type 3: send info
 Waypoint group manipulation report (!GMN)
 Action type 0: create
 Action type 3: send info

Waypoint manipulation (?WMN)

Semi-readable format
 Action type 0: create
 Action type 1: delete
 Base64 encoded format
 Action type 0: create
 Action type 1: delete

Routes

Route request (!CRO)
 Route creation (?RSE)
 Sub-type 0: coordinates
 Sub-type 1: names & coordinates
 Sub-type 3: names, coordinates & tracking radius
 Sub-type 4: coordinates & tracking radius
 Route manipulation (?RAD)
 Route manipulation from Mobile Telematics Terminal (!RAD)
 Route tracking report (!ATW)

4.7. Memory log access commands

Trace log management request (?MTM)
 Trace log management report (!MTM)
 Event log management request (?MEM)
 Movement record request (?MRR)
 Movement record report (!MRR)

4.8. Device configuring commands

Persistent setting configuring (?CNF)
 Setting 0010: MPTP header, exclamation mark (!)
 Setting 0011: MPTP header, question mark (?)
 Setting 0041: primary use of emergency key

Setting 0042: emergency cycle activation method
Setting 0043: emergency cycle cancellation period
Setting 0044: emergency numbers
Setting 0045: service center number
Setting 0046: assistance numbers
Setting 0047: security code
Setting 0048: security code state
Setting 0049: security code request
Setting 0050: authorized numbers
Setting 0051: processing reports
Setting 0059: menu lock
Setting 0060: GPS operating mode
Setting 0061: AGPS SMS number
Setting 0062: AGPS number of satellites
Setting 0063: NMEA output speed
Setting 0064: clear trace
Setting 0065: GPS economy mode sleeping time
Setting 0066: GPS operating mode while connected to charger
Setting 0067: GSM activity while connected to charger
Setting 0068: GPS tuning mode
Setting 0069: GPS tuning parameters
Setting 0070: emergency environments
Setting 0071: emergency confirmation
Setting 0072: emergency confirmation timeout
Setting 0073: emergency call number mask
Setting 0074: status messages
Setting 0075: mobile group numbers / allowed callers
Setting 0076: authorization
Setting 0077: MPTP message buffer
Setting 0078: message validity for MPTP messages
Setting 0079: SMSC number for MPTP messages
Setting 0080: external I/O-box, I/O-pin 1
Setting 0081: external I/O-box, I/O-pin 2
Setting 0082: dataport activity
Setting 0083: LED interface
Setting 0084: battery status messaging
Setting 0085: automatic answer
Setting 0086: audio device
Setting 0090: activity timer
Setting 0100: emergency cycle processing order
Setting 0101: emergency call attempt timeout
Setting 0110: digital input pins
Setting 0111: digital output pins
Setting 0112: analog input pins
Setting 0113: real time tracking numbers
Setting 0114: event log
Setting 0116: automatic trace transfer
Setting 0117: trace transfer data call number
Setting 0118: trace transfer SMS number
Setting 0119: data call speed and carrier type
Setting 0120: default behaviour for location request
Setting 0121: on-time tracking interval limit
Setting 0122: position format
Setting 0123: user interface lock
Setting 0150: manual emergency mode termination
Setting 0152: poor satellite coverage notification
Setting 0153: manual power on and power off
Setting 0154: charging notification
Setting 0155: all incoming calls blockage
Setting 0160: offender control settings
Setting 0170: sensor settings
Setting 0200: phone numbers which use message encryption
Setting 0201: message types which use encryption
Setting 0210: service activation key
Setting 1046: digital input pin assistance numbers
Setting 1101: digital input pin

Setting 1102: digital output pin
Setting 1103: analog input pin
Setting 1150: logging of I/O pin events into the event log
Setting 1151: logging of position fixes into the event log
Setting 1152: event log actions
Setting 1153: event log transfer memory limit
Setting 1154: event log data call number
Setting 1155: event log report number
Persistent setting request (?PSR)
Persistent setting report (!PSR)
Setting 0087: battery info

4.9. Activation of telematics services (?ATS)

4.10. Activation of telematics services report (!ATS)

4.11. Message encryption key setup request (?PWD)

4.12. Reset terminal request (?RST)

4.13. I/O pin control commands

Digital output pin control (?OPC)
Digital output pin control report (!OPC)
I/O pin request (?IOR)
I/O pin report (!IOR)

4.14. Generic response commands

Acknowledgement message(?ACK)
Acknowledgement to tracking permission request
Acknowledgement to condition check permission request
Acknowledgement to route tracking permission request
Error report (!ERR)

APPENDIX I: TRACKBOX NOTIFICATIONS

Trackbox sends various notification messages which are not in normal MPTP format. The following table list the possible notification messages.

Message	Event
TB2: Event log reached notification limit.	Event log got full.
TB2: Data log empty.	Event log was empty when it was requested.
TB2: No data call number.	Data call needs to be made but data call has not been defined.
TB2: Data call connect failed.	Data call connection failed.
TB2: Data call operation failed.	Data call operation failed.
TB2: Emergency cycle activated.	Data call was disconnected because emergency cycle was activated.
TB2: Carrier lost.	Data call connection was lost.

APPENDIX II: FEATURES UNDER SERVICE ACTIVATION KEY

There are several features in Mobile Telematics Terminals that need to be bought separately before they can be used. These features need to be activated with a special service activation key. This key will be provided by Benefon and the IMEI code of the MTT is needed for the key generation.

The service activation key can be inserted to the MTT with Benefon Configurator or with MPTP command,.

Following table lists the features of Track family (including Seraph) that need a service activation key to be inserted:

Feature	Description
Message encryption system	A solution for securing SMS communication.
Waypoint tracking	A solution for tracking a Mobile Telematics Terminal's arrival to or departure from waypoints.
Offender control	A special application for offender controlling
Trace log uploading	A solution for uploading the Mobile Telematics Terminal's trace via data call
Verticality sensor	A solution for monitoring the Mobile Telematics Terminal's verticality.
Track Pro NT 2.0	Software update for Track Pro NT 1.1
Track One NT 2.0	Software update for Track One NT
Position precision information	Enables a possibility of having position precision information in MPTP messages and in a trace log
Economy tracking	A tracking solution which saves costs by sending less messages
Polygonal area tracking	A solution for tracking polygon shaped areas.
User interface lock	A solution for locking the user interface so that the user can only answer incoming voice calls and start an emergency cycle.
Info radar	A waypoint tracking solution where the speed of the terminal is given as a notification limit

Following table lists the features of ESC! that need a service activation key to be inserted:

Feature	Description
Message encryption system	A solution for securing SMS communication
Commander	An application for using terminal as a mobile control center.

APPENDIX III: POSITION PRECISION CALCULATION

Position precision estimation is calculated from multiple variables. These variables include the number of satellites used for position calculation and HDOP (Horizontal dilution of precision). Note that values over 254 are indicated with 255.

APPENDIX IV: GPS TUNING

GPS tuning settings are used for tuning GPS to have position easily or to have a more accurate position. HDOP (horizontal dilution of precision) and SNR (signal to noise ratio) are used for this tuning.