

## TPEG CLIENT-KIT

While conventional navigation systems are limited to getting the user quickly from point A to point B, the next generation of digital helpers will deliver complete and current information, provide reliable forecasts of traffic development and offer additional technologies such as seamless navigation. This is made possible by the TPEG coding standard (Transport Protocol Experts Group). Fraunhofer FOKUS is offering a TPEG client kit for the reception and utilization of coded TPEG messages. The kit facilitates management of TPEG messages with little memory requirements and makes them available to subsequent applications. The software package is especially well-suited for mobile devices or embedded systems with limited resources (low cost/ low energy).

### Features

Fraunhofer FOKUS is offering TPEG software for applications according to ISO/TS 21219 (TPEG2). The TPEG client kit is available for mobile device platforms (Java ME)

as well as for desktop and server systems (Java SE). It can additionally be integrated in various development platforms (e.g. C++, .NET). It covers the key functions of processing TPEG data:

- Data reception: communication with the receiving hardware for live reception of local databases via DxB or TCP/IP.
- Decoding: Decoding of the binary TPEG protocol and conversion into data objects for the representation of message content. Optional output in tpegML. Intelligent procedures reduce system requirements.
- Data management: A resident database monitors the generation, updating, and deletion of message objects and keeps current and detailed traffic information at hand.
- Intelligent data access: Subsequent applications can easily access the message database and select traffic information according to regional, temporal, or semantic criteria.
- Data presentation and interfaces: The TPEG client kit is capable of generating readable text and data for processing

all relevant TPEG information.

A programming interface facilitates event-driven signaling. This allows for the easy and efficient connection of subsequent applications.

- Monitoring: The TPEG client kit makes it possible to monitor and analyze the database. A flexible application displaying the database in real-time is available for tests and evaluations.

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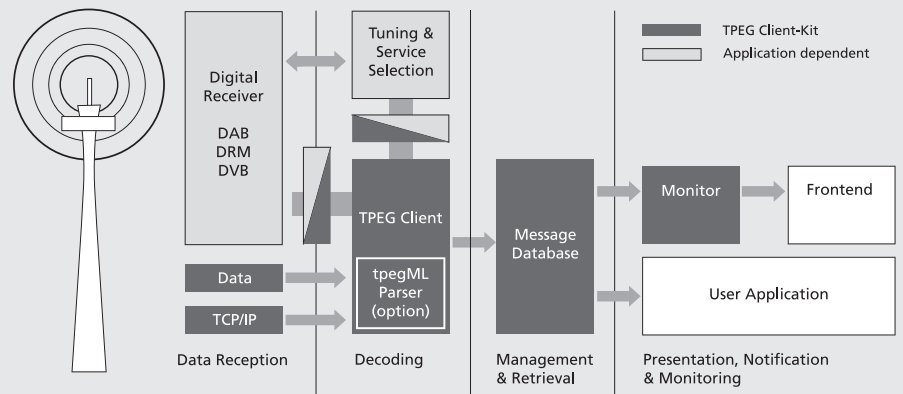
### System Requirements

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- 150 MHz Processor
- 6 MB free memory space within the Java Virtual Machine (JVM)

Minimum requirements for the JVM:

- Embedded Version: Java ME with CLDC 1.1, MIDP 2.0, JSR 75, or CDC1.1
- Desktop/Server Version: Java SE 1.4 (1.6 for option tpegML parser)



## Application Areas

Fraunhofer FOKUS supports clients from the automotive, telematics, logistics, and broadcasting domains with the development and implementation of TPEG applications and provides a TPEG testbed. Fraunhofer FOKUS has developed an Android app for reception of up-to-date traffic information on smart phones. Current TPEG messages, for instance on traffic jams or construction sites, are displayed on a road map and refreshed upon contact with the touchscreen. At present, applications exist for the cities of Berlin and Hefei (China). In close cooperation with the Frontier Silicon company, Fraunhofer FOKUS is developing a sample application facilitating the reception of TPEG services via digital broadcasting (DAB+). Prototypical hardware was equipped with a DAB+ reception module for this purpose. A TPEG monitoring app based on Android is collecting incoming TPEG messages and places them on a digital map. Additional information on the respective messages can be activated by clicking on them. Innovative navigation solutions are made possible through GPS localization. The sample application demonstrates the impending transition from RDS-TMC via VHF radio to the significantly more powerful TPEG via DAB+. Another sample application is the implementation of the TPEG client kit on the Automotive Telematics On-board unit Platform (ATOP) by NXP. This allows the utilization of TPEG for the transmission of safety-relevant information. By displaying colored light signals and text messages, the demonstrator warns of aquaplaning (blue), traffic jams (yellow),

and accidents (red). The ATOP system, a low cost/low energy OBU solution, supports the e-Call emergency system with which all new vehicles are expected to be equipped from 2015 on. Communication is realized using a GSM/GPRS connection allowing the transmission of TPEG via TCP/IP. The hardware provides enough resources to decode and process up to 5.000 TPEG messages.

## TPEG

TPEG is the enabling technology for a new generation of traffic information services that are distributed through digital channels. The binary TPEG protocol is particularly well-suited for digital broadcasting (DAB, DRM, DVBx) because of its small demand of transmission bandwidth. The transmitted information can be used on mobile platforms (e.g. navigation systems or cell phones) as well as in stationary systems like digital traffic signs or for web-based traffic information services. To facilitate the exchange between service providers, XML versions (tpegML) are available in addition to the efficient binary representation. TPEG consists of a collection of ISO TS norms. It is continuously evolved by the Traveller Information Services Association (TISA). TISA is a non-profit organization with more than 100 members from industry and public institutions.

## Testbed for Intelligent Transport Systems

The TPEG client kit is a component of the testbed for intelligent transport systems which comprises all processing levels for traffic information:

- Service Center: collection, preprocessing, and management of data
- TPEG coding and packaging, transfer for data transmission
- Test data generation
- Backchannel support

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