

NATIONAL ACCESS POINT Communication Interface Description

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1 Glossary

| Term/Abbreviation | Definition |
|--------------------------|--|
| Datex II | A standard developed by the CEN Technical Committee 278, CEN/TC278, for information exchange between traffic management centres. |
| Data Provider | Subject providing Data to NAP (KPD) |
| Data Receiver | Subject receiving data from NAP (KPD) |
| GDDKiA | General Directorate for National Roads and Motorways (Generalna Dyrekcja Dróg Krajowych i Autostrad). |
| Communication Interface | Set of internet services to exchange Data in M2M (Machine-To-Machine) mode. |
| NAP | National Access Point (KPD - Krajowy Punkt Dystrybucyjny) |
| M2M | Machine-To-Machine |
| Machine-To-Machine | Direct communication and data exchange between devices |
| OpenLR | Application library for decoding of local data irrespective of the map. See website link: www.openlr.org |
| XML | Extensible Markup Language - markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable |

2 Information on the document

This document includes description of initial specification of communication interface which is a part of the system named KPD - Krajowy Punkt Dostępowy do informacji o warunkach ruchu (NAP – National Access Point), developed by the GDDKiA - Generalna Dyrekcja Dróg Krajowych i Autostrad (General Directorate for National Roads and Motorways).

This document is designed to be used by the NAP users, and it describes ways and conditions on how to obtain connection to the system and how to use the system.

NOTE:

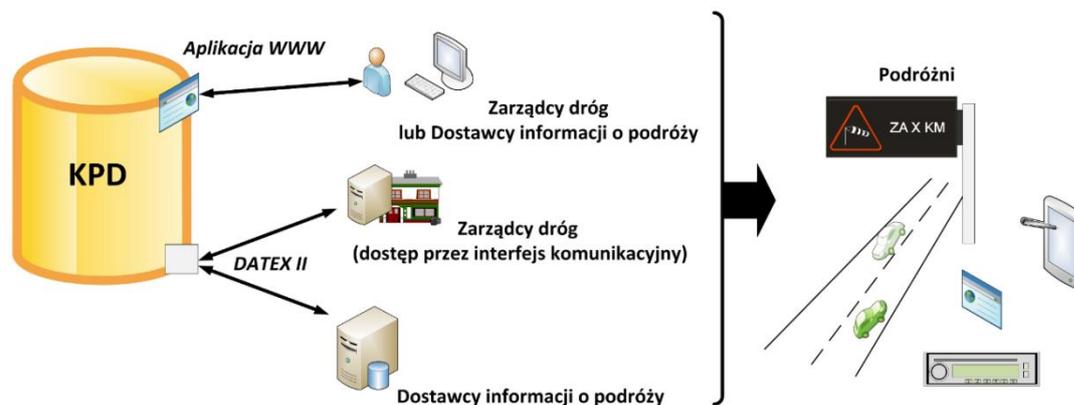
The current version of this manual was prepared at the system design stage and will be subject to changes at subsequent stages.

3 Information on the system

Role of the NAP is to exchange ITS data on the national level. The system focuses on Data Providers – institutions and organizations providing data on traffic conditions and Data Receivers – receiving that data.

3.1 General system architecture

The NAP general architecture is shown in the picture below:



PIC 1 THE NAP GENERAL ARCHITECTURE

(source: GDDKiA)

NAP does NOT pass the ITS information directly to the drivers and other road users – these activities belong to the Data Receivers. They can join the data received with other travel information.

NAP enables data exchange both in manual mode – with operator entering the data manually in the internet browser, as far as Machine-To-Machine

(M2M) mode, with the user system exchanging data automatically, using via Communication Interface, with the NAP. Both ways are described in the following parts of this guidance.

3.2 Data range and quality

NAP collects Data from road managers, which are Data Providers.

Data provided by Data Providers are immediately passed to all registered Data Receivers.

The system utilizes the following categories of incidents:

| # | Data Class (Datex II) | Data Type (Datex II) |
|----|--|---|
| 1. | Temporary slippery road | Slippery road, Snowmobiling, Loose gravel, Oil on the road, Gasoline on the road, Ice on the road, Black ice, Winter slime, Irregular ice |
| 2 | Animals, people, Obstacles, Debris on the road | Objects on the road, Large objects on the road, Overturned trees, Avalanches, Rock landscapes, Landslides, Animals on the road, People on the road, Children on the road, Cyclists on the road, Big animals on the road, Herd of animals on the road, People throwing objects on the road, Broken vehicle, Broken truck |
| 3 | Unsecured accident site | Unsecured accident site |
| 4 | Short-term road works | Cleaning work (removal of obstacles), Maintenance work, Slow moving service vehicle, Painting of pavement |
| 5 | Limited visibility | Decreased visibility, Smoke, Dense fog, Irregular fog, Dizziness, Glistening |
| 6 | A vehicle going upstream | A vehicle going upstream |
| 7 | Uncontrolled roadblock | Road blocked, Blocked bridge, Blocked tunnel, Blocked trip, Blocked road, Blocked entry |
| 8 | Exceptional weather conditions | Big snowfall, Heavy rain, Hurricane, Strong wind, Side wind |

TAB 1 INCIDENT CATEGORIES IN SYSTEM

Every Data Provider is responsible for delivering the reliable data. Once entered, data may be updated by the owner. Passing Data that may affect system stability and reliability may result in immediate disconnection from the system.

3.3 NAP Technology

NAP can be understood as a set of web services accessed through the internet. In order to ensure an efficient and fast communication exchange concerning the traffic conditions there is applied Communication Interface – a set of web services (web-services) and Datex II protocol. This interface allows connecting the system of Provider/Receiver to the NAP in an automatic way (so-called M2M - Machine-To-Machine). There are available two modes of the interface operation, basing on a Datex II specification: (a) Notification about new incidents (Datex Publisher Push on occurrence) and (b) Downloading all current incidents (Datex Client Pull).

In order to locate incidents independently from a specific version of a map, there is used an OpenLR library, applied within the frames of the Datex II protocol.

Documentation of the Datex II protocol is available on the website:
www.datex2.eu

Documentation of the OpenLR is available on the website:
www.openlr.org

4 Format of the message

Messages processed in the system have the following structure:

| |
|---|
| Class & type of disruption |
| Road No |
| Location |
| Mileage (kilometre post) and length of disruption |
| Direction |
| Date & time of the beginning |
| Date & time of the expiration / finish |
| Description of disruption |
| Driving advice |
| Provider updating the data (filled automatically) |
| Date & time of update (filled automatically) |

TAB 2 MESSAGE STRUCTURE

4.1 Communication Interface

Communication Interface allows data exchange in an automatic way (M2M) and is designed for connecting NAP with the systems of Data Providers and Data Recipients.

Via the Communication Interface there are sent communicates in compliance with the protocol Datex II – basing on the XML European

format of transferring data on traffic conditions.
An exemplary communicate Datex II has the following form:

```
<?xml version="1.0" encoding="UTF-8"?>
<d2LogicalModel modelBaseVersion="1.0" xmlns="http://datex2.eu/schema/1_0/1_0" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://datex2.eu/schema/1_0/1_0">
  <payloadPublication xsi:type="SituationPublication" lang="pl">
    <publicationCreator>
      <nationalIdentifier>GDDKIA</nationalIdentifier>
    </publicationCreator>
    <situation id="GUID2A22530C-D452-4ae8-B942-993BC2923D13">
      <situationRecord xsi:type="Accident" id="GUID2A22530C-D452-4ae8-B942-993BC2923D14">
        <situationRecordCreationTime>2017-02-28T15:54:13+01:00</situationRecordCreationTime>
        <validity>
          <validityStatus>definedByValidityTimeSpec</validityStatus>
          <validityTimeSpecification>
            <overallStartTime>2006-10-17T14:00:00+02:00</overallStartTime>
            <overallEndTime>2006-10-17T16:00:00+02:00</overallEndTime>
          </validityTimeSpecification>
        </validity>
        <accidentType>accident</accidentType>
      </situationRecord>
    </situation>
  </payloadPublication>
</d2LogicalModel>
```

PIC 2 EXAMPLE DATEX II MESSAGE

Communication Interface can operate in two modes:

- (1) Datex Publisher Push on Occurrence
- (2) Datex Pull

4.2 Datex Publisher Push on Occurrence mode

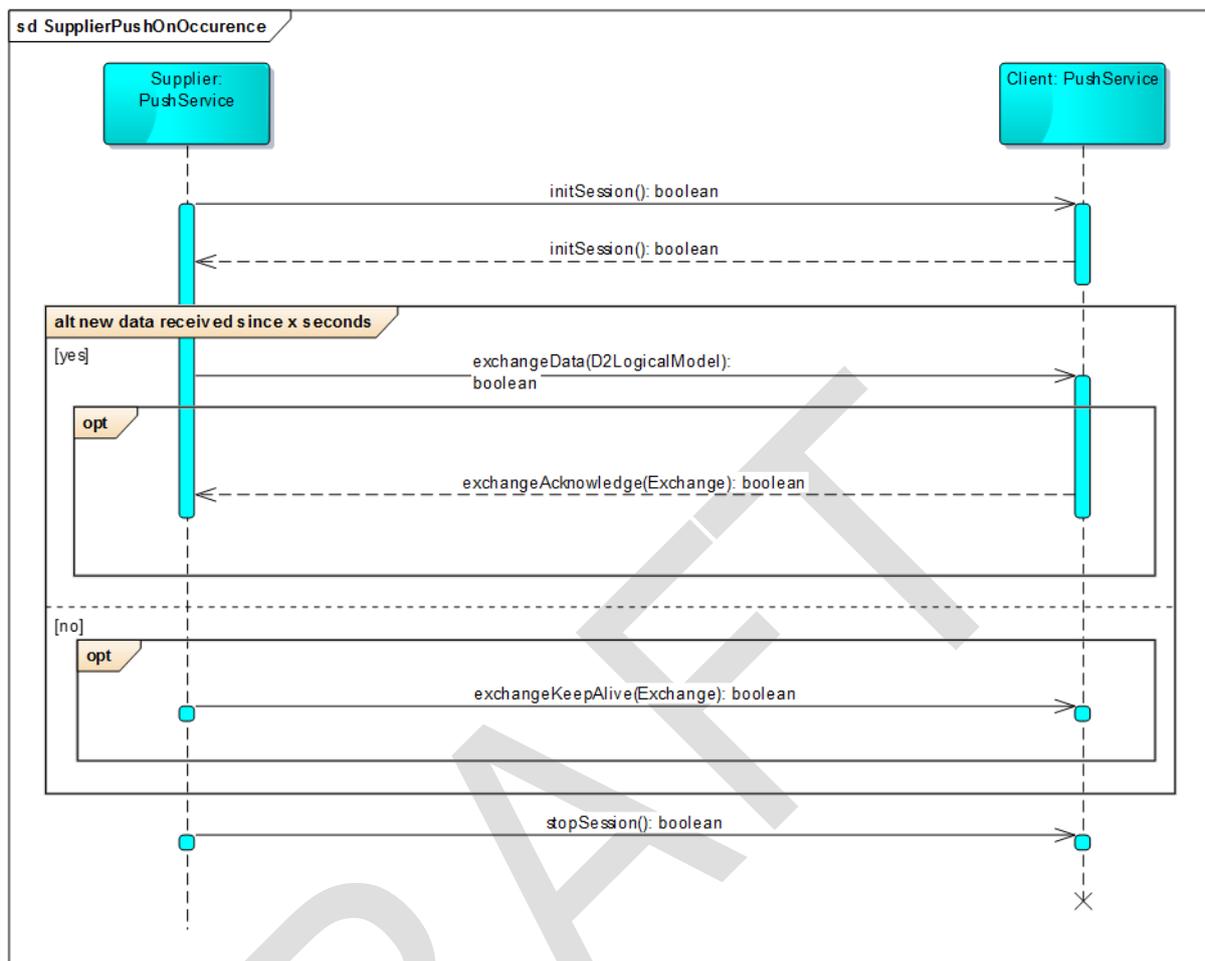
Datex Publisher Push on Occurrence mode is a basic operation mode of the NAP.

This mode enables the user to register in the service and to receive information on new incidents and modified incidents from the moment of registration.

This mode is described in the documentation Datex II v2.0 Software Developers Guide, on the website:

<http://www.datex2.eu/sites/www.datex2.eu/files/DATEXIIv2.0-DevGuide.pdf>

Sequence Diagram for this mode is presented below:



PIC 3 SEQUENCE DIAGRAM, DATEX II PUBLISHER PUSH ON OCCURENCE

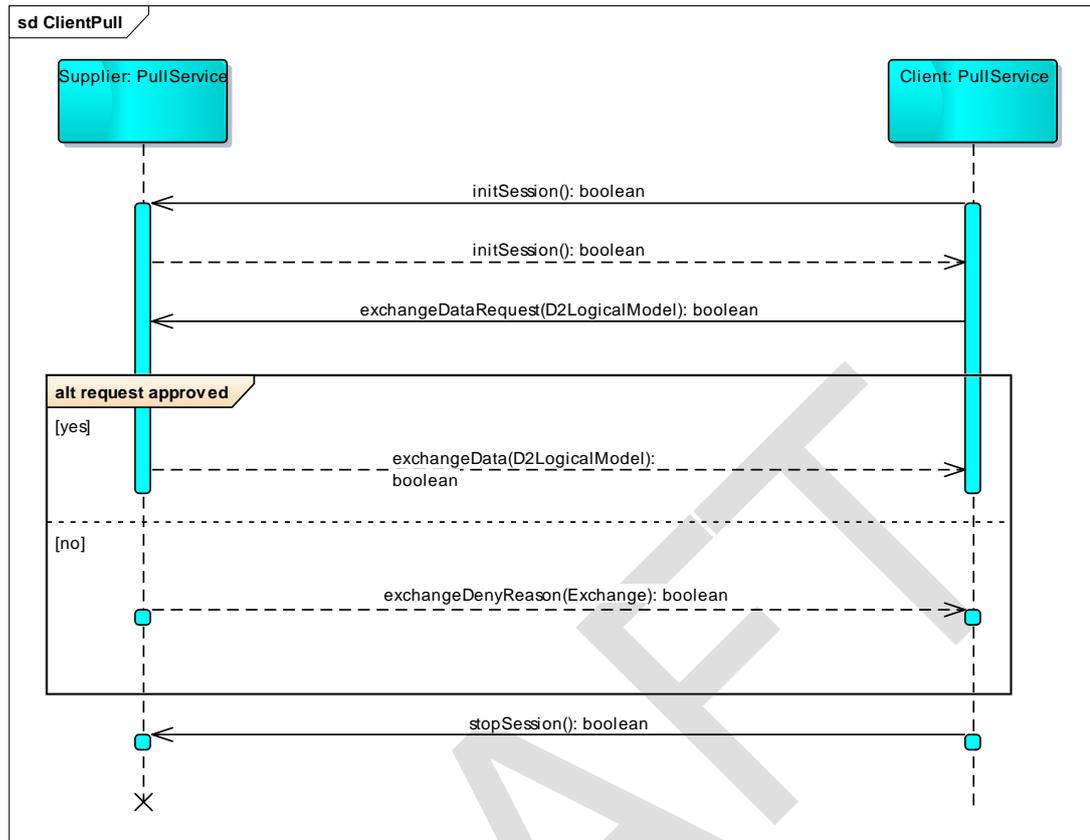
4.3 Datex Client Pull mode

In this mode a user downloads information about all incidents which at that moment are active (i.e. does not download information about incidents which have already ended or their date and time of start is later than the time this service was selected).

Description of the documentation Datex II v2.0 Software Developers Guide is available on the website:

<http://www.datex2.eu/sites/www.datex2.eu/files/DATEXIIv2.0-DevGuide.pdf>

Sequence Diagram for this mode is presented below:



PIC 4 SEQUENCE DIAGRAM, DATEX II CLIENT PULL

NOTE: This mode of operation, because of large quantities of data, is an EMERGENCY mode – its use is limited to two downloads per 24 hours for each user.

5 Emergency situations

During the operation of the system there is a possibility of three types of emergency situations to occur:

5.1.1 NAP failure

The NAP is equipped with a series of systems preventing from failures, however, as in case of every complex system, failures cannot be ruled out completely.

In this case, the NAP will not accept or share any communicates, instead of the application websites there will be displayed static sites informing about a failure:

In case of a communication through a Communication Interface, errors will be notified:

[Error codes will be defined in the final version of this specification]

After restoring the NAP operation, there will be launched downloading and sending out communication. Data Providers' systems should in such cases withhold transferring messages and restart them after the system is restored.

5.1.2 Data Provider's system failure

In case of a failure on the side of a Data Provider, after restoring the system he/she should transfer to the NAP the communicates on disturbances which have not been delivered and are still valid.

5.1.3 Data Receiver's system failure

The NAP sends out communicates on incidents in the Datex Publisher Push on Occurrence mode – only once, until finished or until receipt error notification (e.g. exceeded time limit).

In such case, the communicate is not preserved for further use and Data Receiver faces a threat of losing data which has been added or underwent changes during the time his/her system has not been receiving messages.

In order to prevent from the problem of data loss, downloading current data in the mode Datex Client Pull can be applied.