3te Tagung, Aktive Sicherheit durch Fahrerassistenz.

Summary.

“GST and eCall – a contribution to pan-European standardization of the emergency call within the Intelligent Car Initiative”.

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GST and eCall – a contribution to pan-European standardization of the emergency call within the Intelligent Car Initiative.

Summary

The i2010 Intelligent Car Initiative, which was launched in 2003, is intended to accelerate the integration of new, intelligent technologies in vehicles to make them safer, cleaner and more efficient. In this context the Integrated Project GST, Global System for Telematics, was co-funded by the European commission within the Framework Program (FP6). The project was driven by more than 50 key stakeholders in the European telematics industry with the goal of specifying an open end-to end architecture for automotive telematics services. Because eSafety is one important driver harmonising technical solutions and ensuring interoperability across different European countries, safety related services, amongst others eCall, play a major role in the GST project. The presentation will focus on the eCall proof-of-concept demonstrations done by the GST Munich Test Site, which set up a test bed for validating safety services and GST core concepts.
In collaboration with the Bavarian Red Cross, Mondial-Assistance, T-Systems and Orange three different eCall solutions have been implemented as a prototype. The main characteristics are:

1. “Basic eCall”: In case of an accident the in-vehicle device will transmit an emergency call - generated either automatically or by one of the vehicle’s occupants pressing a button - which consists of a voice-call to the nearest emergency center (PSAP) and a data-transmission to a national eCall server. The PSAP will pull the dataset, called Minimum Set of Data (MSD), directly from the server. The data-transmission is done using the GSM signalling channel USSD.

2. “Premium eCall” (Pull): The first alternative “Premium eCall” can be subscribed to by the customer and allows him to enrich the dataset with personal information. The customer database will be administered from a Service Aggregator, who will receive the data-Call and add, by customer order, additional information. This Full Set of Data (FSD) will be forwarded to a national eCall server. At the same time the voice-Call will be received from a Service Provider which will serve the role of a mediator between vehicle and PSAP. The Service Provider is able to access the server-based eCall dataset. If the Service Provider judges the call as a real emergency call, it will unlock the data for PSAP access and call the PSAP or arrange a conference call with the vehicles’ occupants. The PSAP has to pull the data from the national eCall Server. WebService interfaces are used between all entities.

3. “Premium eCall” (Push) with “Last-Mile”-Integration: The last implementation is based on the same infrastructure as solution 2, but a push-solution for the dataset is implemented based on Java-Spaces technology. In addition a solution is implemented to push the dataset from the PSAP to a mobile device to realize continuous data transmission from the vehicle to the ambulance team. A mobile device based automatic route guidance provides directions to the scene of accident, using the GSP-data from the received dataset.

The prototypes implemented demonstrate different possibilities to harmonize an in-vehicle emergency call across Europe. In all implementations, the eCall server concepts are proven viable. USSD as a data-transfer channel has been successfully integrated but needs further investigation. The “Last-Mile”-solution was proven very valuable from the emergency center to avoid communication problems with the ambulance team. The solution is under further investigation from the Bavarian Red Cross.
More detailed information and “Lessons Learned” are part of the presentation enclosed.

GST and eCall -
A contribution to pan-European standardization of the emergency call within the Intelligent Car Initiative.

BMW Group
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eCall Standardization across Europe.
What is the scope?

Create a pan-European solution available to all vehicles and users

- Determine the complete emergency chain
- Cross-Border operation
- Automatic and manual call-activation
- Include a voice-call (112) and data-transmission (GPS-Position etc.)

- Reduction in traffic death rates (2500 p.a.*) and number of severe injuries (15%*) across Europe
- Reduce of response time 40-50%* („golden hour“)
- Reduce traffic congestion 20%*

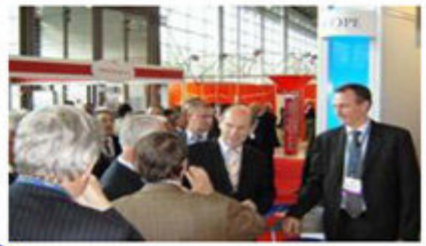
* Based on E-MERGE project and Exploratory Study on the potential socio-economic impact of the introduction of Intelligent Safety Systems in Road Vehicles: SeiSS final report.

eCall Standardization across Europe.
Who is driving this?

i2010 Intelligent Car Initiative

The i2010 Intelligent Car Initiative

The i2010 Intelligent Car Initiative was launched on 23 February 2006. It will build on the work of the eSafety initiative and follows a three – pillar approach



i2010 Intelligent Car Initiative

Intelligent Car Initiative

eSafety Forum

RTD in ICTs FP5, FP6, FP7

Awareness Raising Actions

15 Working Groups
- eCall Driving Group
- Communications
- Road Map
- .....

Projects
- Prevent
- CVIS
- GST
- ....

Awareness Actions
- eSafetyAware
- Studies
- "Intelligent Car Events"
- Campaigns

European Commission Information Society and Media

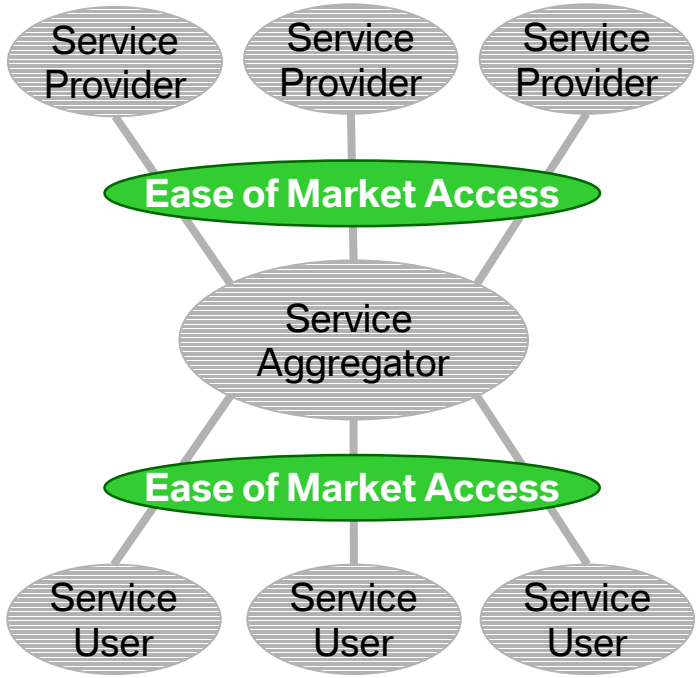
GST-Global System for Telematics.
Mission.

"Create an environment in which innovative telematics services can be developed".

"Show technical feasibility of eSafety services, especially eCall".

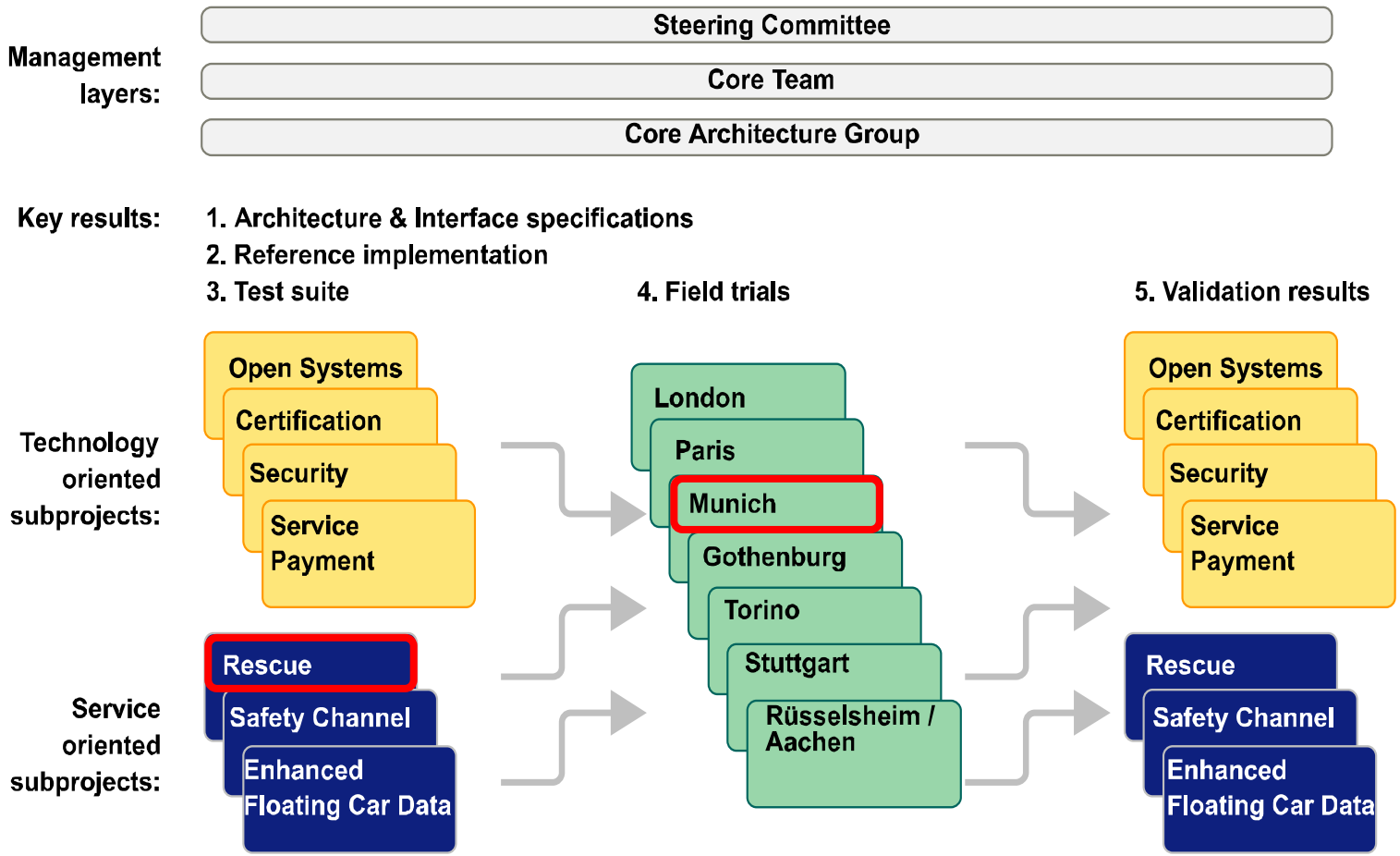
Avoid unduly high barriers of market entry

Freedom of choice in service consumption



„eSafety has potentially HIGH impact on the creation of the Telematics market"

GST-Global System for Telematics.
Organization.



- **GST was driven by 49 European companies**

More information about GST: http://www.gstforum.org

GST-Global System for Telematics.
Goals of Munich Test-Site.

The Goals of the Munich Test Site are:

- To implement, and validate a telematics approach based on open protocols, such as OMA DM, SAML and Web Services, and including end-to-end security and identity management to elaborate trustworthy personalization

- To prototype innovative safety telematics including, but not limited to emergency response: **eCall**, broadcast, vehicle-vehicle

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T Systems
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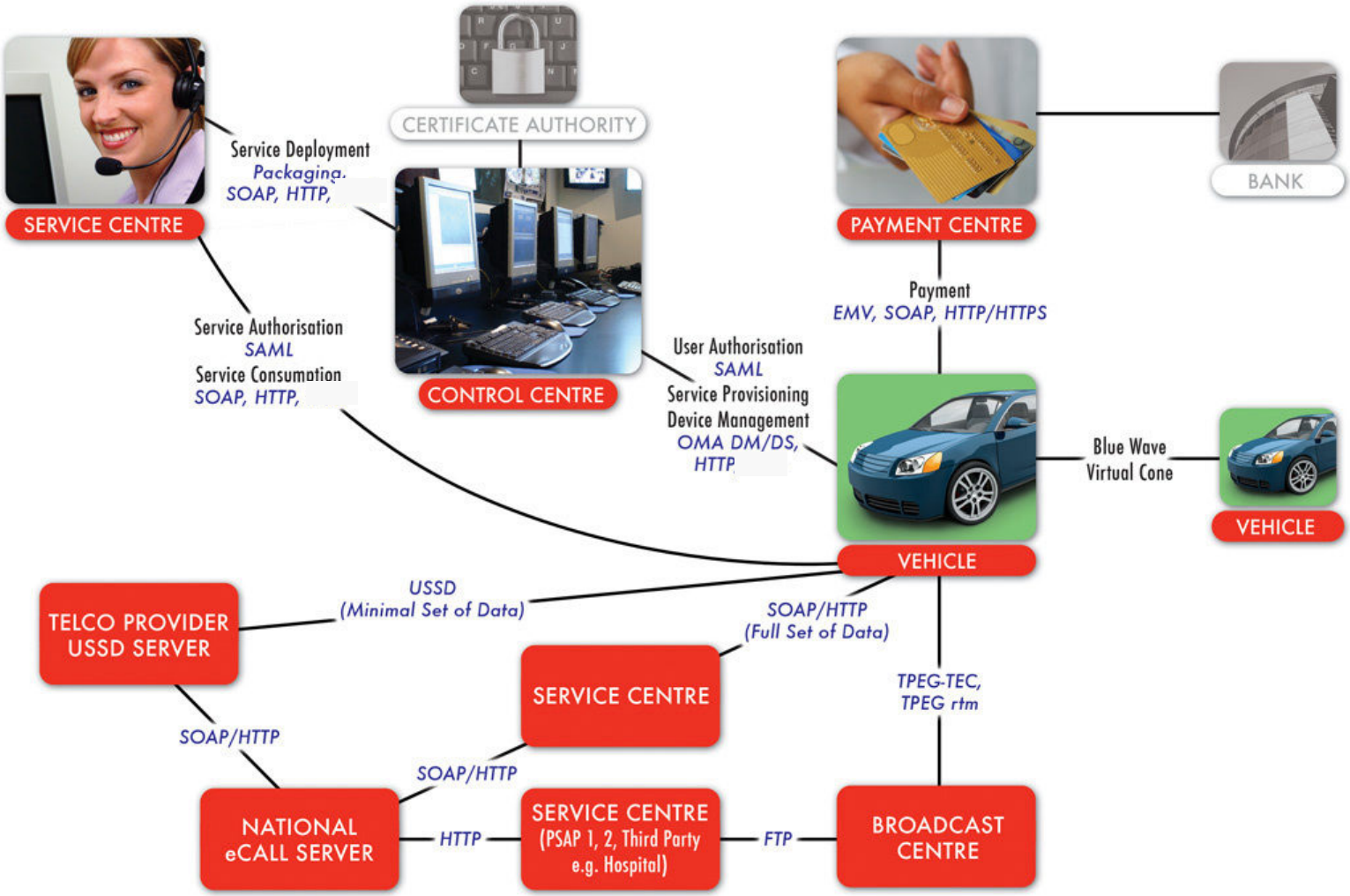
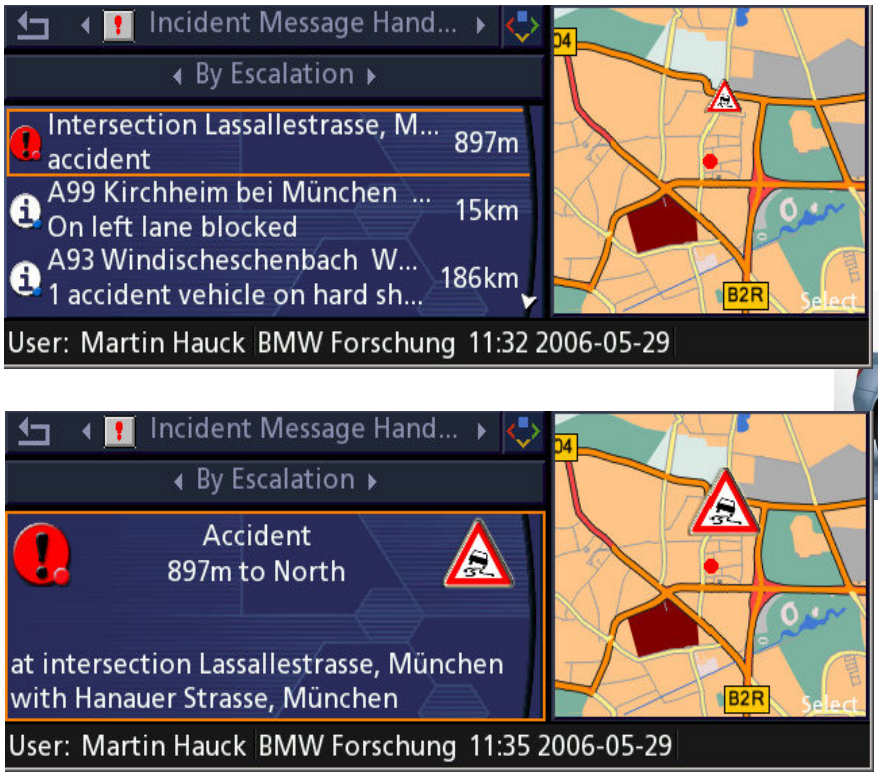
GST-Global System for Telematics.
High Level Architecture.



Seamless Service Scenario.
eCall, Safety-Channel and Car2Car.



Example:
In-Vehicle Warning Application based on
Safety-Channel and Car2Car Communication

Emergency-Call today.
Example BMW Assist.

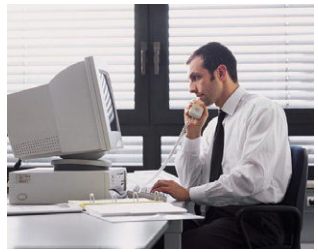
GPS

Vehicle

GSM

1. Speech

2. Data (SMS)



Call Center Service Provider

Customer Database

Speech

Speech

Speech

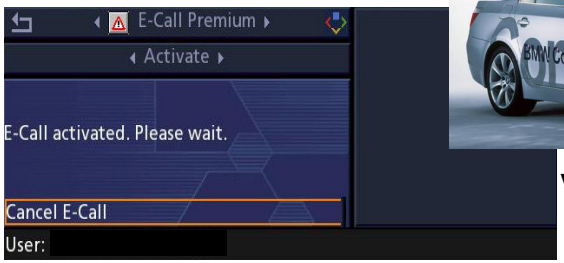
Public Safety Answering Point (PSAP 1)

Paramedic / Ambulance team (PSAP 2)

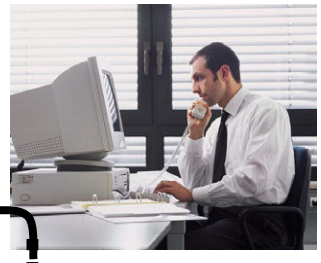
Flying Ambulance (PSAP 2)

Pan-European eCall.

European Commission Request.



Option*



Call Center
Service Provider

Vehicle

Data

112 Speech

Data

* Discussed as possible option – „Third Party eCall“

Speech

Data

Public Safety
Answering Point
(PSAP 1)

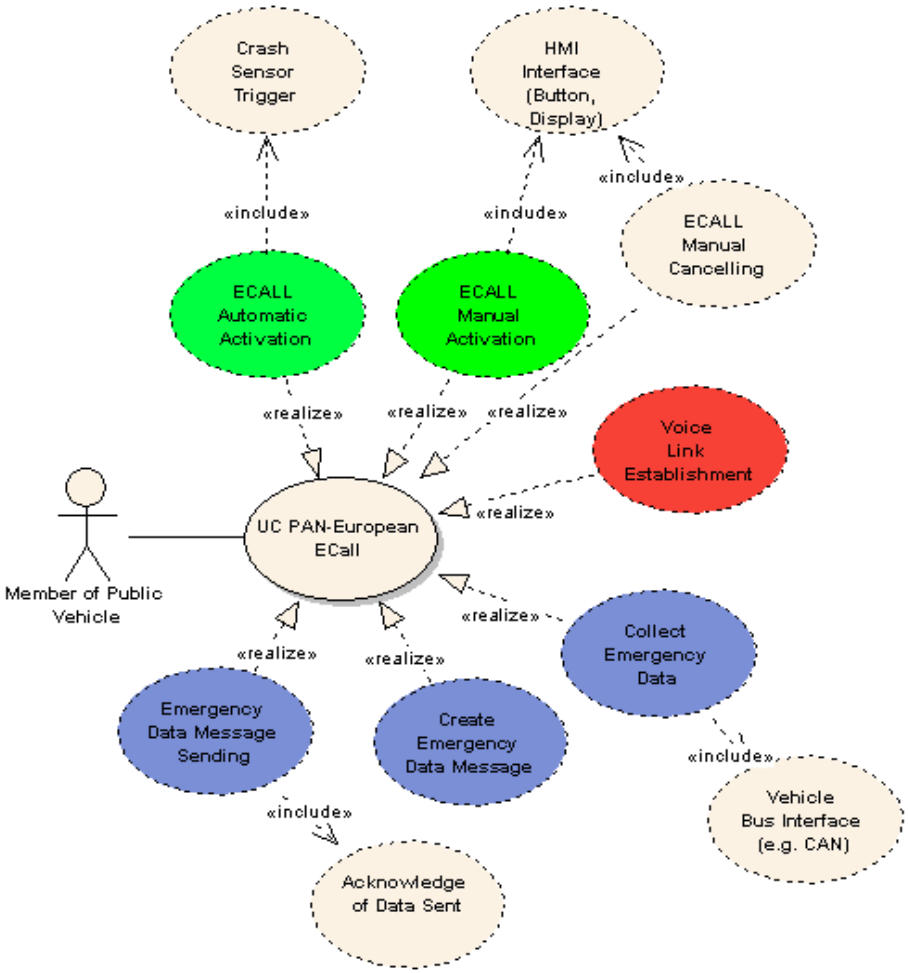
Speech

Data

Paramedic / Ambulance team
(PSAP 2)

Flying Ambulance
(PSAP 2)

Pan-European eCall.
The Challenge.



- Standardization:
  - Manual or Automatic Activation
  - Establish voice-Call (via 112 with/without SIM)
  - Routing of voice-Call to PSAP
  - Specification of the Minimum Set of Data (MSD)
  - Data Protocol used (PSAP-interface)
  - Transmission Network
  - Data Routing to PSAP

Pan-European eCall.

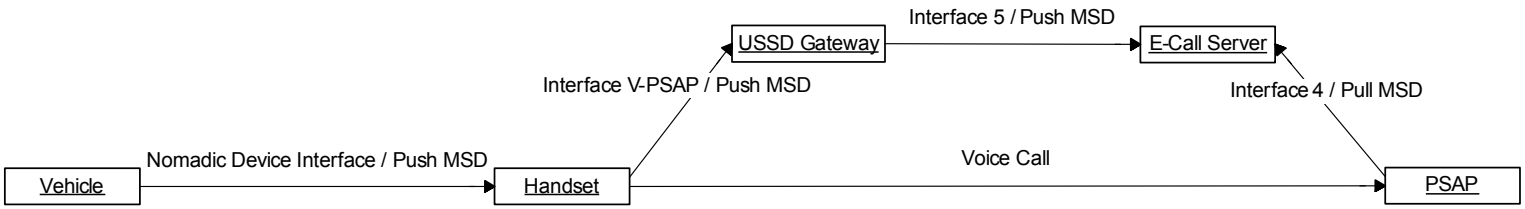
Challenge – eCall Management chain across Europe.

Configuration						Example
Telco	PSAP1	PSAP2	Telco + PSAP1	PSAP1 + PSAP2	Telco + PSAP1 + PSAP2	
		X	X			UK, where BT is actually working as Telco and PSAP1 as well.
X	X	X				Sweden, where a national service provider (SOS Alarm) is in charge to handle 112 call by law.
X				X		Italy, where, due to the fact that E-112 and PSAP role are not defined yet, an Emergency Authority (Carabinieri) is handling 112.

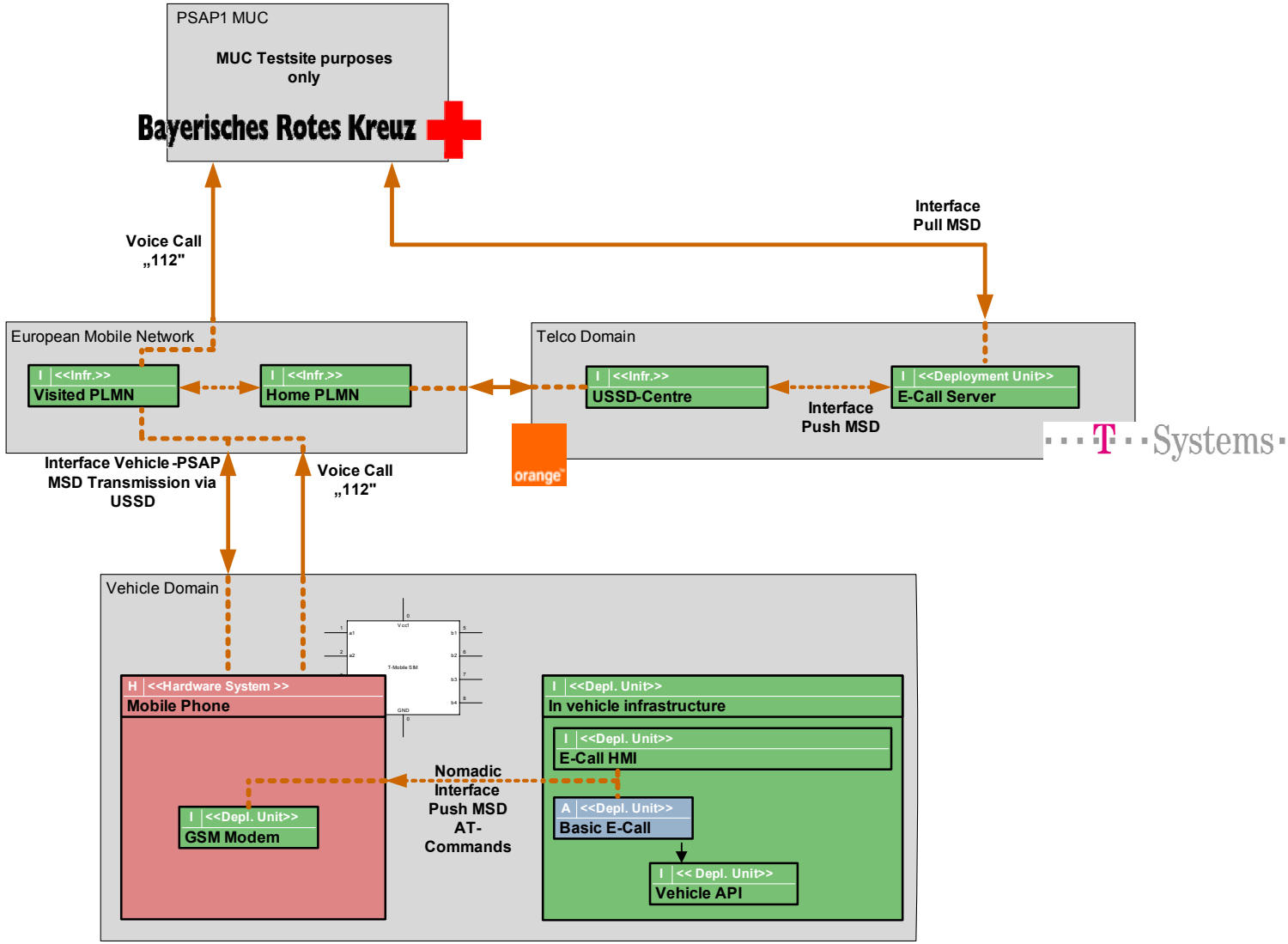
eCall Munich Test Site – „Basic eCall“. Overview.

Main Characteristics

- No Call Centre / Service Provider
- One central eCall-Server per country which will be accessed from PSAP to get MSD information (Pull).
- A 112 substitute is used for test purpose.
- For MSD transport GSM signaling channel and USSD is used.
- Use ASN.1 BER for message description and encoding.
- Use TCAP to realize transaction between vehicle and eCall-Server; dialogue operations sendMSD, ackMSD, eosMSD
- PSAP has a web browser based interface (HTML over HTTP(S).



"Basic eCall".
Domain View.

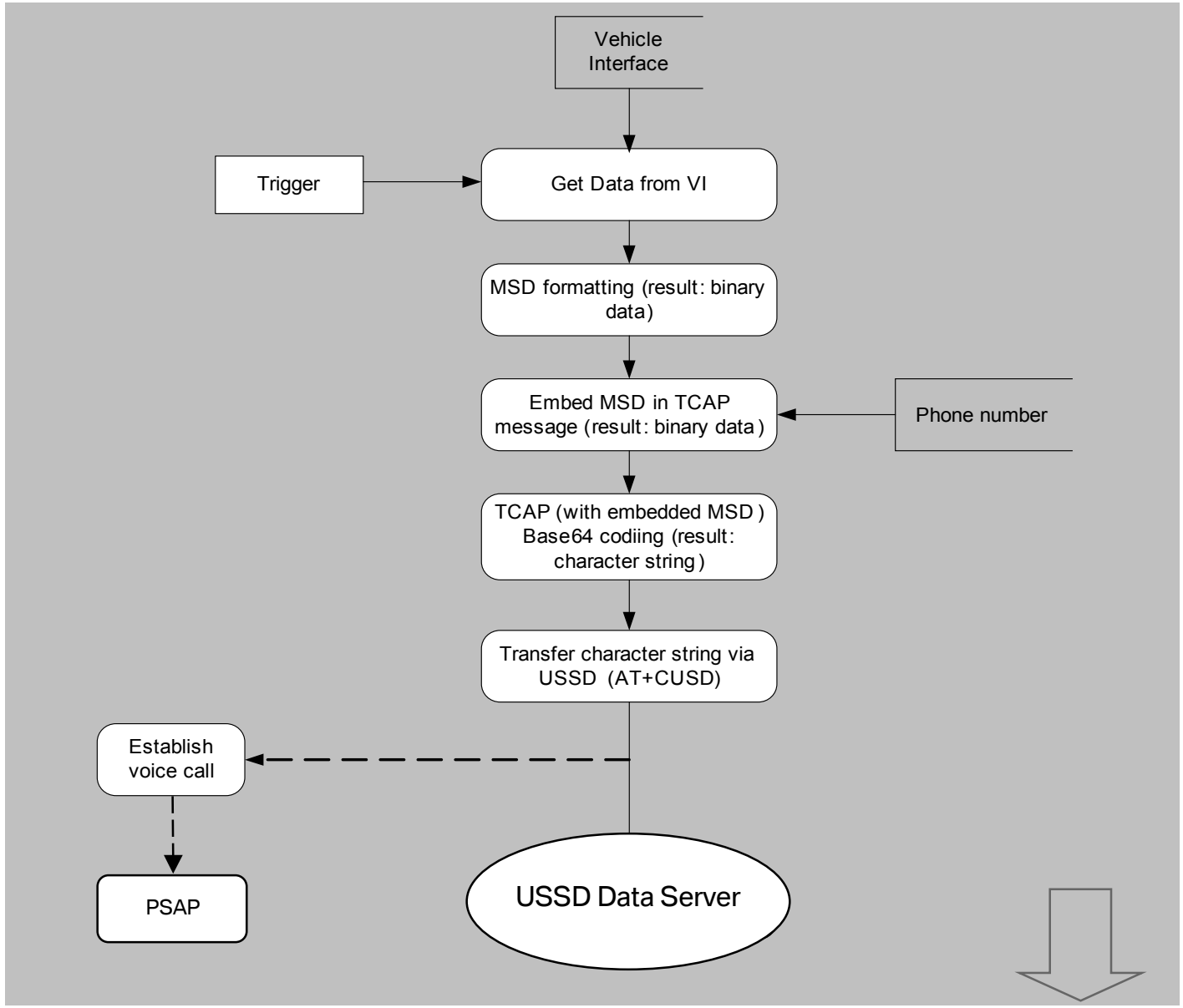


MSD:= Minimum Set of Data

PLMN:= Public Land Mobile Network

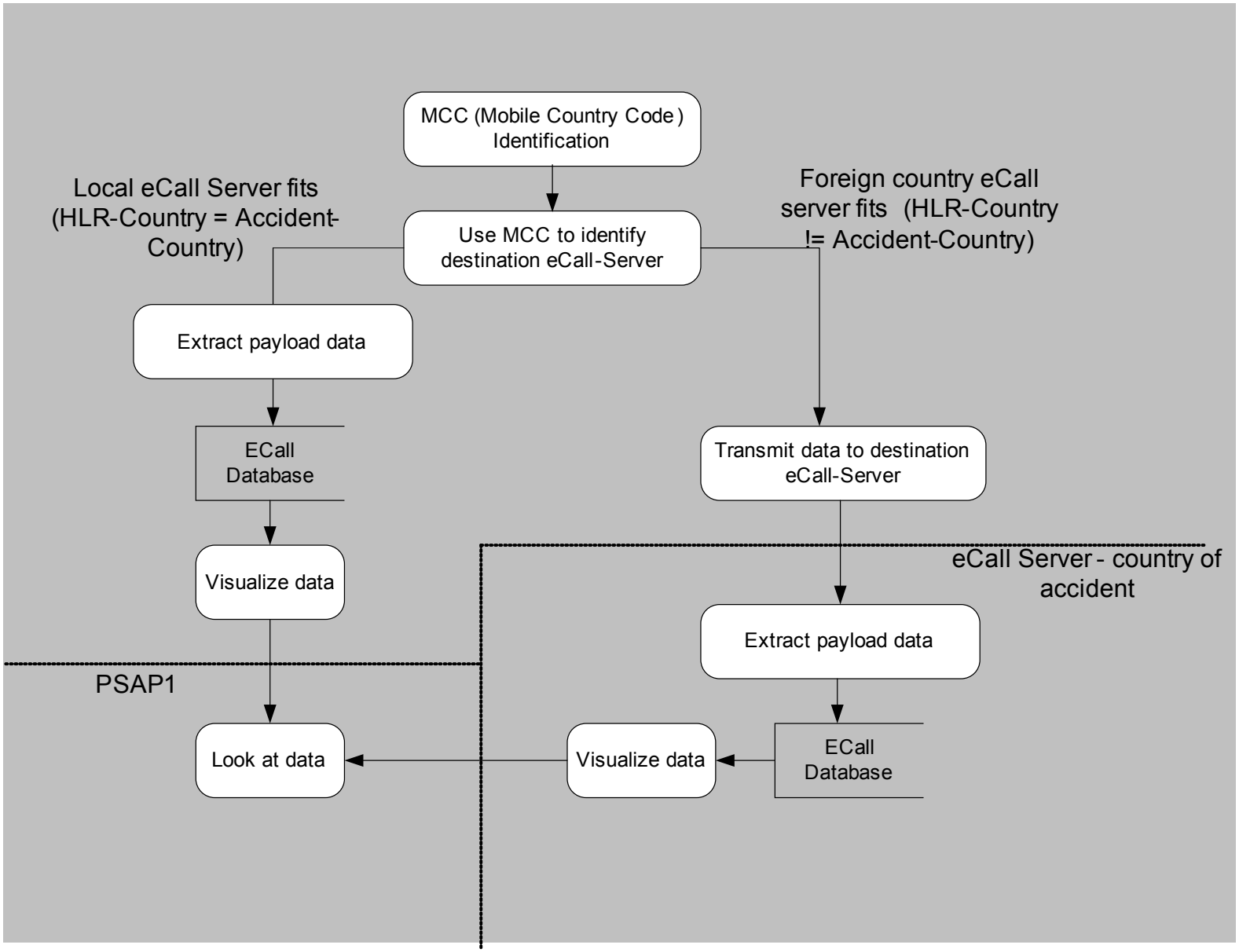
„Basic eCall“.

Data Flow Vehicle / Handset to USSD-Server.



“Basic eCall“.

Data Flow USSD- and eCall-Server, PSAP.

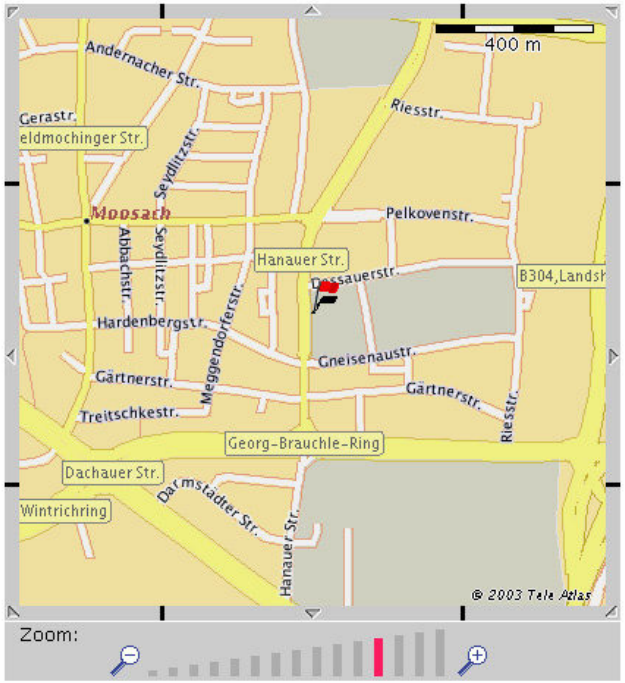


eCall Munich Test Site.
PSAP Viewer.

T · Traffic ·

PSAP eCall Viewer

GST



Jan 13, 2006 3:02:50 PM

Vorgang beenden | Abbrechen

Unfalldaten:

Rufnummer:	33607705174
Zeitpunkt:	13.01.2006 14:48:57
GPS Koordinate:	Länge: 11.529°, Breite: 48.180°
Ort:	80992;München;Hanauer Straße
Art der Auslösung:	Manuell
Ausgelöste Sensoren:	
Fahrtrichtung:	

Fahrzeugdaten:

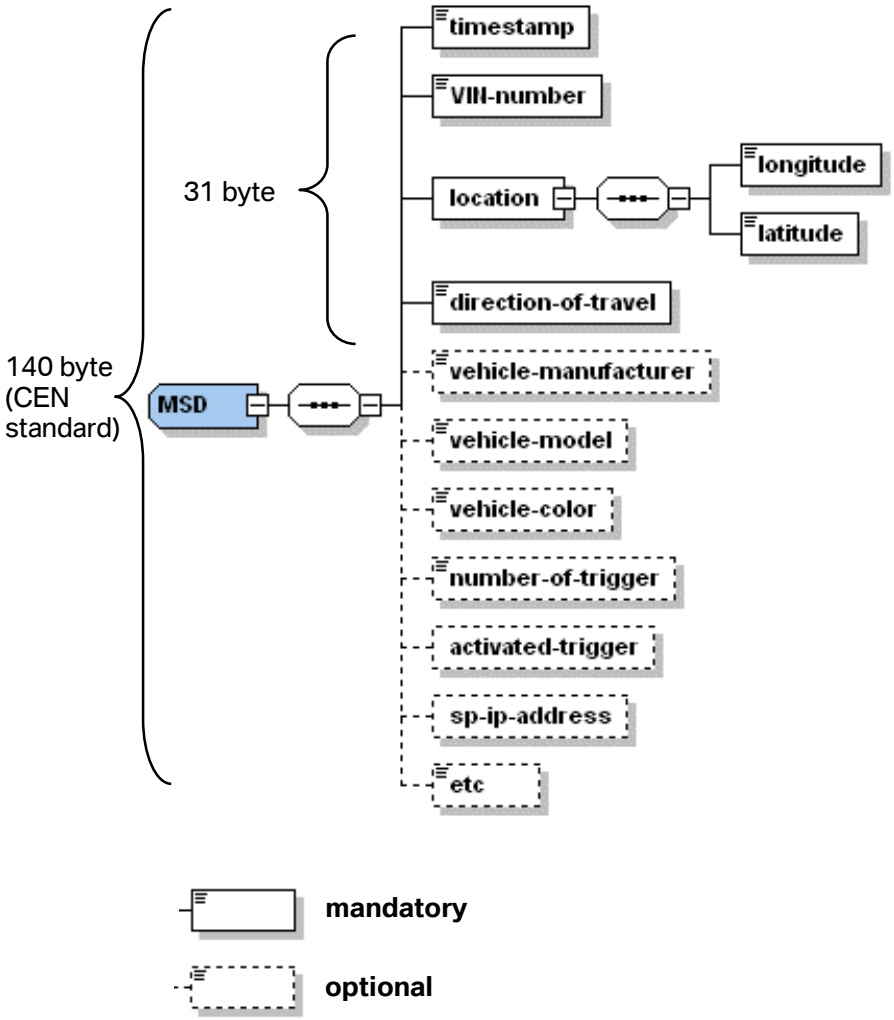
Marke:	BMW
Modell:	530d Limousine
Farbe:	
Kennzeichen:	M-JV4260
Land:	Deutschland
Fahrgestellnummer:	X12345

Diensteanbieter:

Rufnummer:	
IP-Adresse:	http://munich.gstproject.org:9000/axis/services/ECallService

Zusätzliche Daten des Diensteanbieters

eCall Munich Test Site.
Minimum Set of Data (MSD).



MSD : ASN.1 BER encoded data.

„When“ - via timestamp.

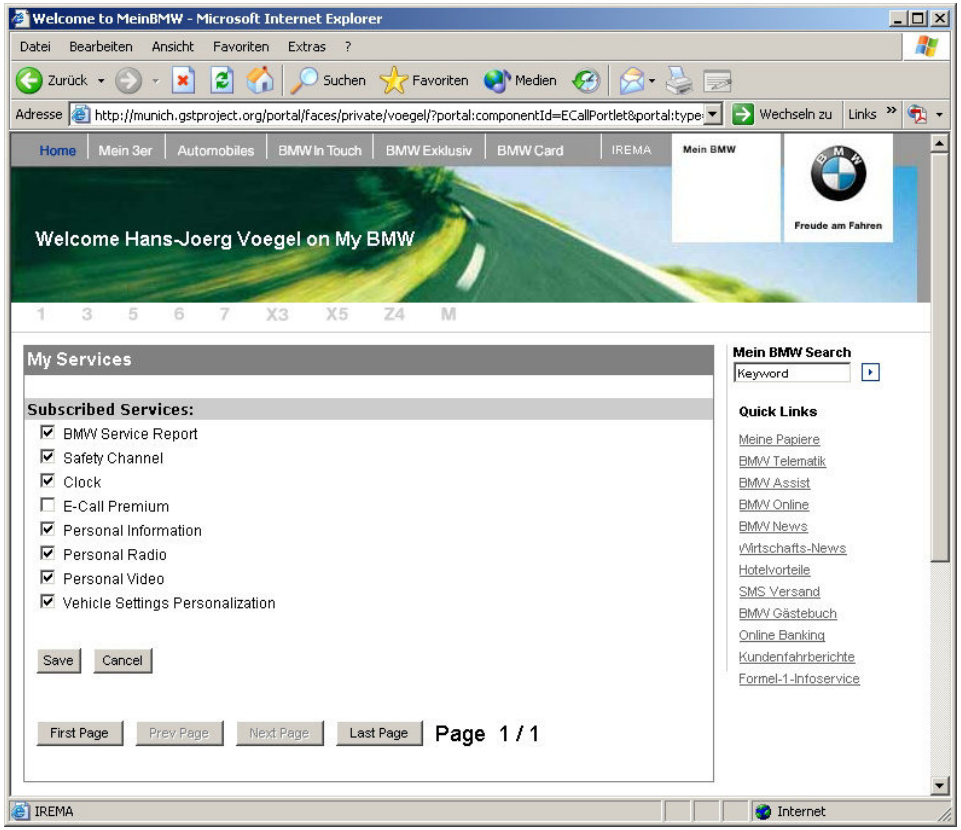
„Where“ - via GPS/Heading.

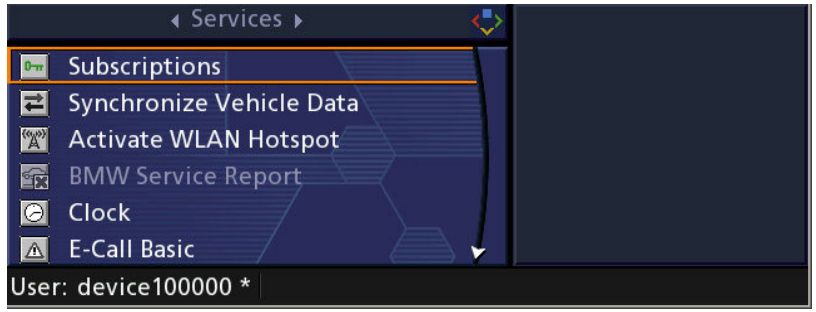
„Who“ - via CLI and vehicle

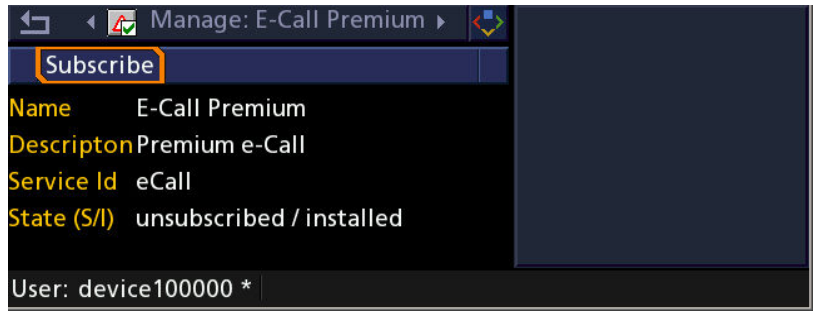
eCall Munich Test Site –„Basic eCall“.
Lessons Learned.

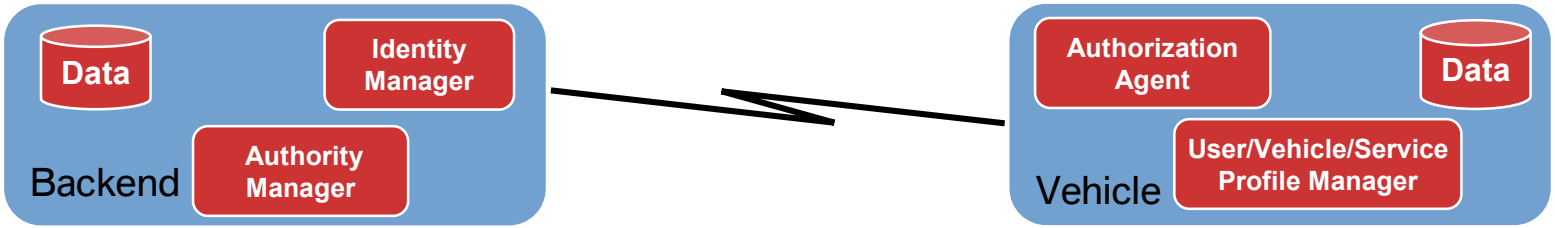
- eCall USSD protocol stack has been successfully integrated. USSD was shown in a cross border scenario.
- eCall server concept proven viable.
- USSD requires further harmonization among telco operators across Europe.
- Different routing of voice and data could cause problems in worst case situation.
- There was none or only a small delay between PSAP receiving voice call and eCall server data availability.
- Direct PSAP access from vehicle could generates false call and language problems. Use of SIM-card could reduce this problem.
- The Pull-solution minimize the investment on PSAP-level (web Browser based interface). It could create problems if the customer is not able to speak after the accident.
- With the examined infrastructure it is not necessary to standardize the PSAP interface.

eCall Munich Test Site -“Premium eCall”.
Subscription and Personalization.





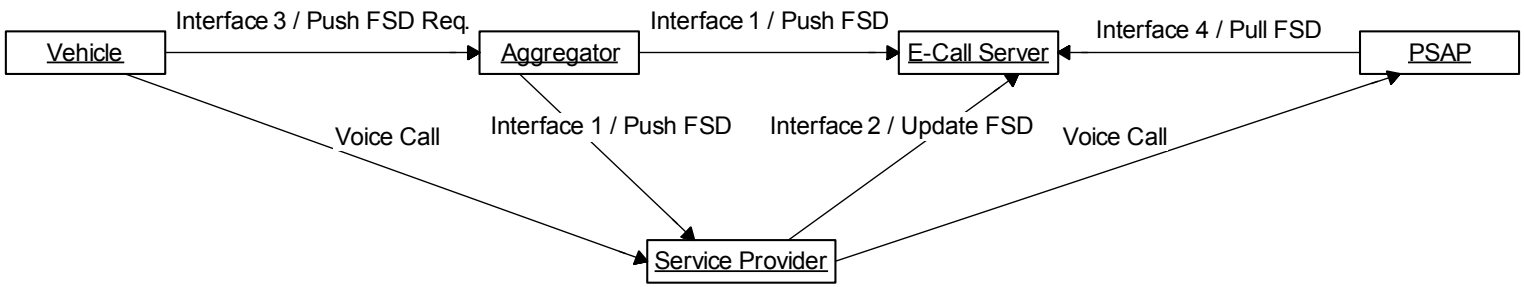




eCall Munich Test Site -“Premium eCall” (Pull). Overview.

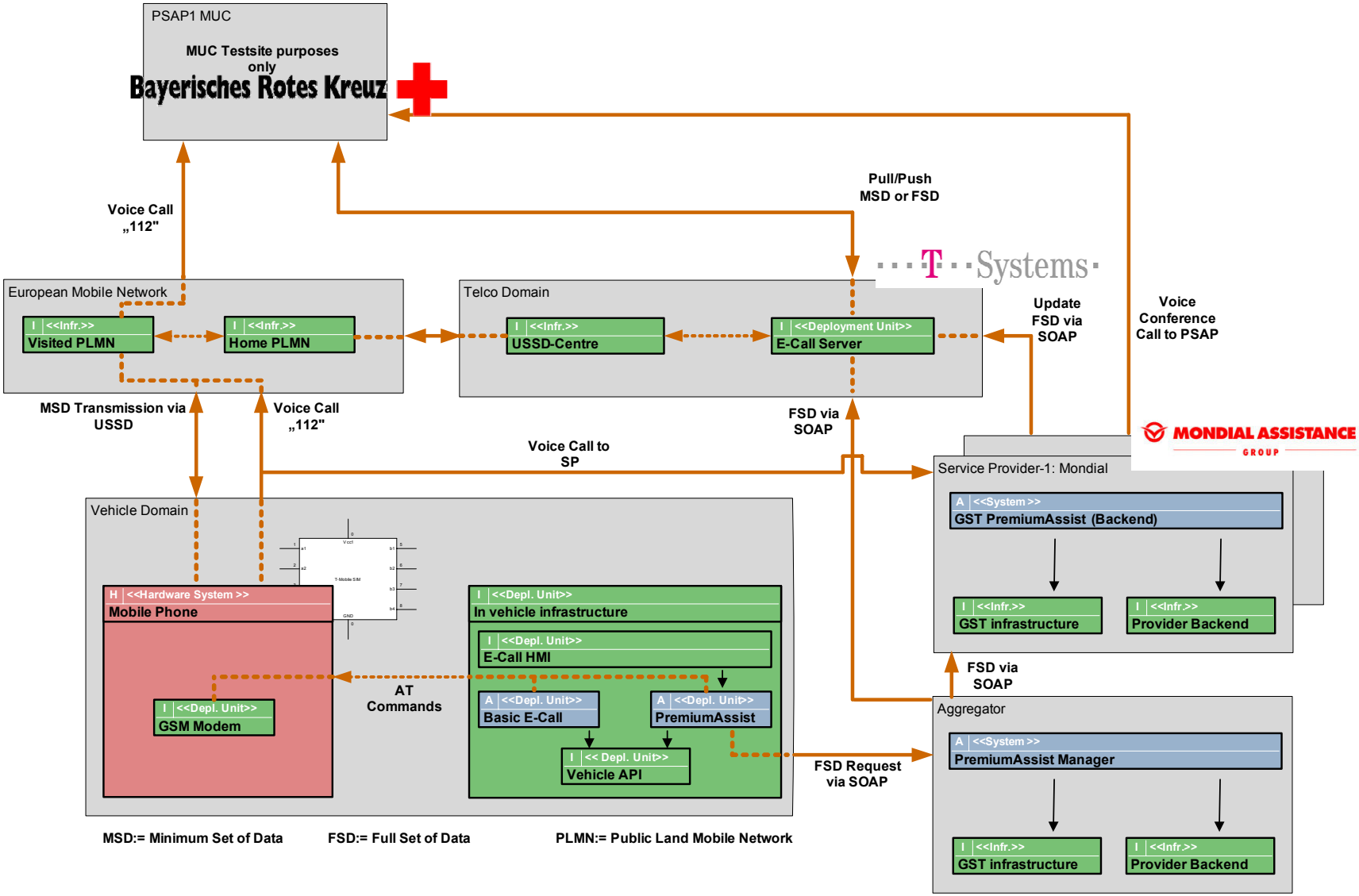
Main Characteristics (check text !)

- Use of an extended dataset called FSD (Full Set of Data), MSD enriched with user specific information.
- A Service Aggregator has the customer database and is responsible to create the FSD.
- Service Provider / Call Center takes the role of a mediator between vehicle and PSAP.
- One central eCall-Server per country which will be accessed from PSAP to get FSD information (Pull).
- SOAP 1.2 over GPRS is used to transmit the FSD (FSD-Request, FSD-Reply – Interface 3), web-Services also used for Interface 1, 2.
- PSAP (IF 4) has a web browser based interface (HTML over HTTP(S).



eCall Munich Test Site.

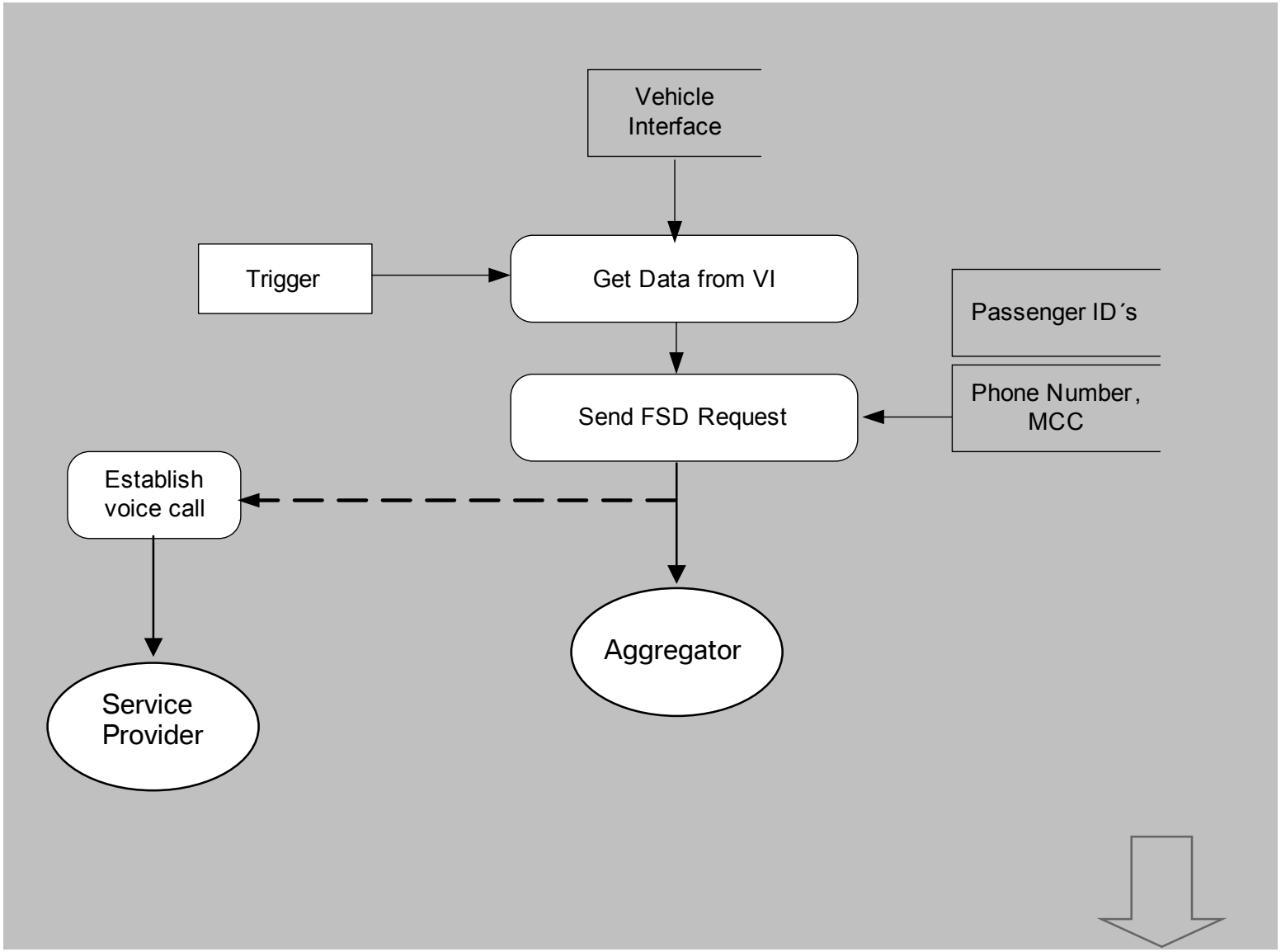
Domain View of “Premium eCall” (Pull).

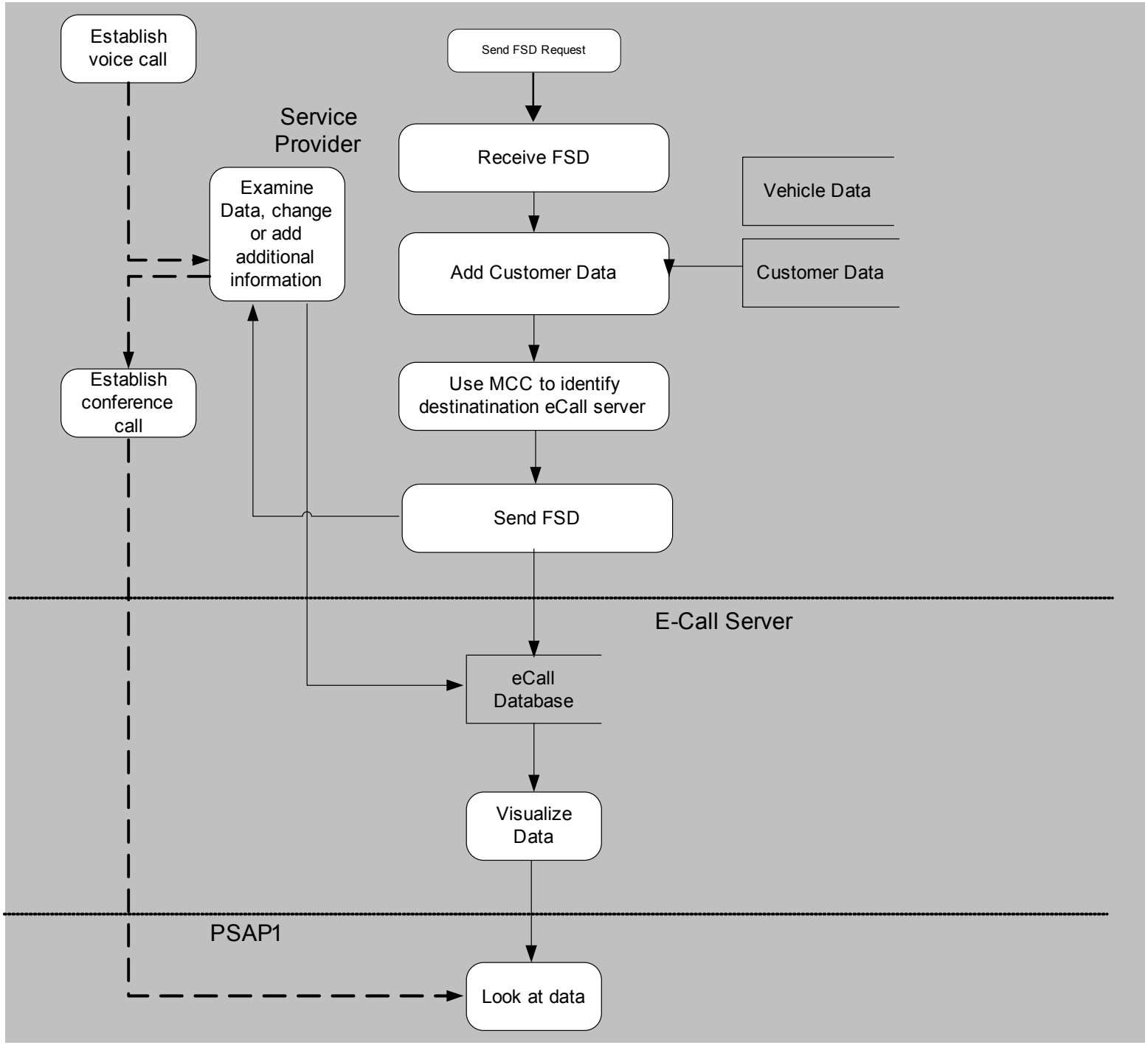


„Premium eCall“.
Vehicle FSD-Request.

```
<FullSetOfDataRequest>
  <Version>0</Version>
  <SequenceNumber>55018485675078 1001</SequenceNumber>
  <TimeStamp>2005-10-25T08:35:27Z</TimeStamp>
  <Vehicle>
        <MCC>262</MCC>
        <MNC>01</MNC>
        <MSISDN>33607705174</MSISDN>
        <VIN>X12345</VIN>
  </Vehicle>
  <Status>
        <ManuallyActivated>true</ManuallyActivated>
  </Status>
  <Waypoint>
        <TimeDifference>0</TimeDifference>
        <Location>
              <Latitude uncertaintyEstimate="10.0">50.7324</Latitude>
              <Longitude uncertaintyEstimate="10.0">7.097</Longitude>
        </Location>
  </Waypoint>
  <CustomerIdentifier>michel</CustomerIdentifier>
  <PassengerIdentifier>6</PassengerIdentifier>
</FullSetOfDataRequest>
```

„Premium eCall“.
Data Flow.




Establish voice call
Send FSD Request
Service Provider
Receive FSD
Examine Data, change or add additional information
Vehicle Data
Add Customer Data
Customer Data
Establish conference call
Use MCC to identify destinatination eCall server
Send FSD
E-Call Server
eCall Database
Visualize Data
PSAP1
Look at data

„Premium eCall“.
Example for Full Set of Data – Medical Data.

Proposal for Additional Emergency Data DGAI and BÄK*

- Diagnosis.
- Allergy / Drug Intolerance.
- Surgery.
- Last Immunisation Tetanus / Hepatitis B.
- Current Medication.
- Contact Information (Doctor, Emergency Contact Person).
- Existing Living Will.
- Existing organ donation pass.
- Other medical information.

Other possible optional FSD-Data: Number-of-Passengers, Passenger-ID (used in GST Munich test-site) Crash-severity, Vehicle-Roll-Over etc.

*

DGAI – Deutsche Gesellschaft für Anästhesiologie und Intensivmedizin

BÄK – Bundesärztekammer

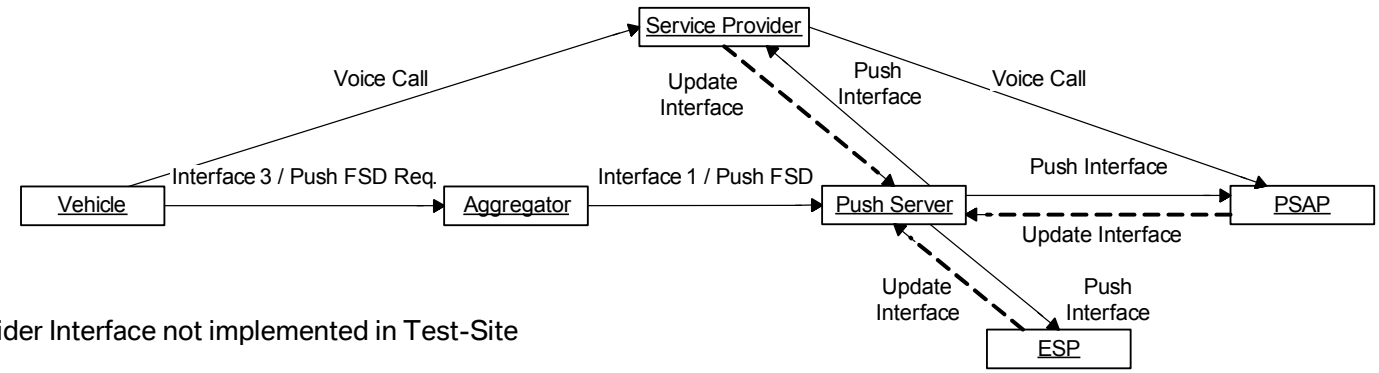
eCall Munich Test Site –„Premium eCall“ (Pull). Lessons Learned.

- The Service Provider is able to take the role of a “clearing instance” and avoid false calls to the PSAP.
- The Service Provider is able to avoid language problems.
- The Premium eCall allows personalization, e.g. by creating passenger id´s which will be transferred via the FSD to identify the passengers. To add customer specific information, i.e. medical data, is valuable for PSAP and ambulance team.
- Medical Data must be created in an own database on service aggregator level with customer authorization. In this context privacy is a big topic.
- webService Interfaces are a reasonable option if data volume across GPRS (FSD-request) is limited.
- PSAP to ambulance team communication based only on voice can produce delays in response time.

eCall Munich Test Site -“Premium eCall” (Push). Overview.

Main Characteristics

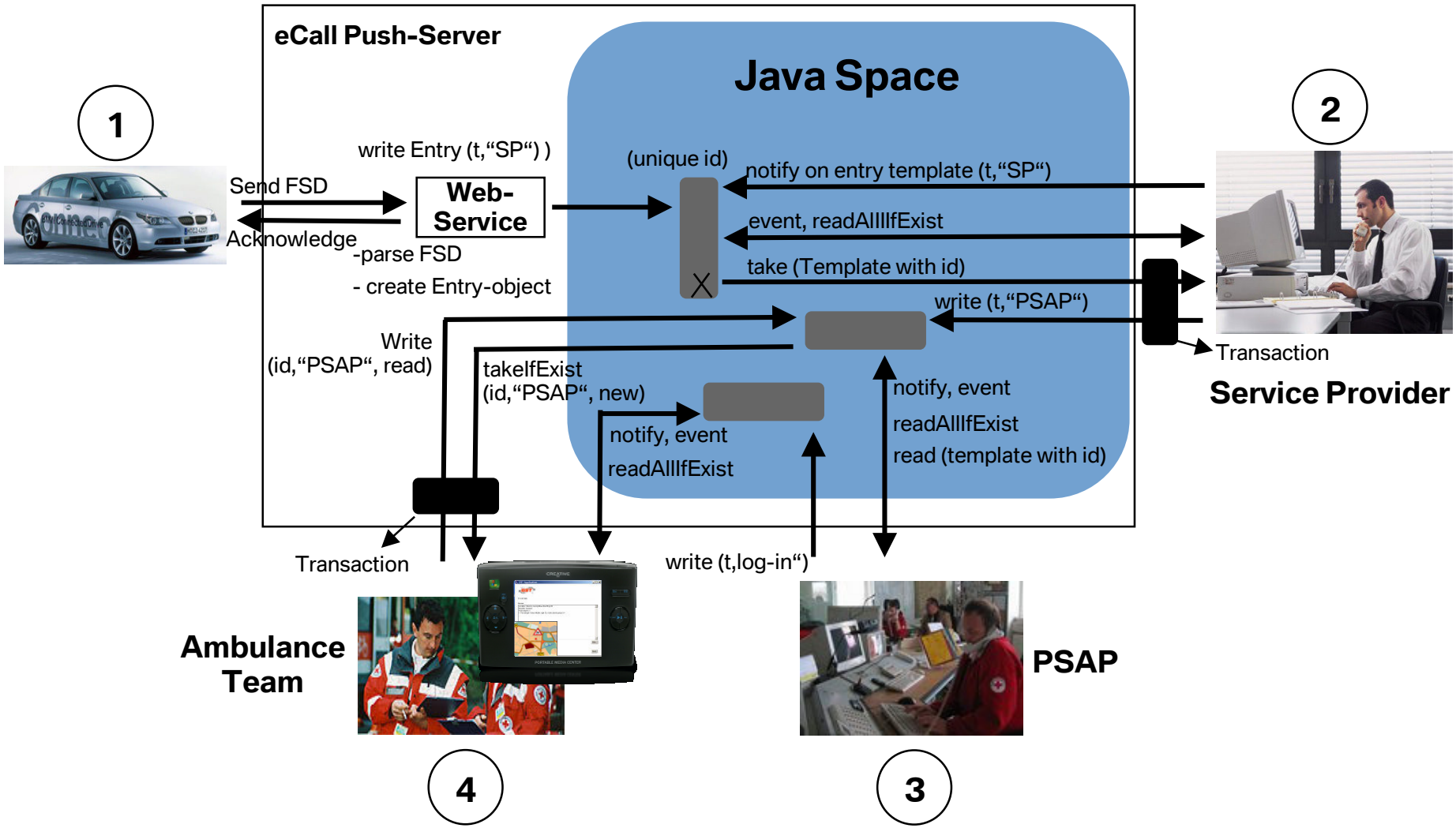
- Use of an extended dataset called FSD (Full Set of Data), MSD enriched with user specific information.
- The FSD-transfer is extended via a “Last-Mile Implementation” using a Mobile Device. The PSAP pushes the data to the Mobile Device which will be used from the emergency personal/doctor. An automatic route-guidance is included.
- The Push-solution is based on an eCall Push-Server using Java-Spaces technology to store, notify and forward eCalls to the Service Provider*, PSAP or Mobile Device.
- Service Provider and PSAP, and Mobile Device are running a Java-Application using the Java Spaces Client interface.



*Service-Provider Interface not implemented in Test-Site

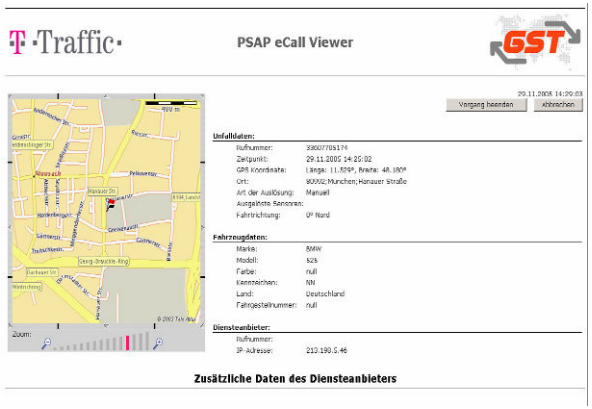
“Premium eCall” (Push).

eCall Push-Server.



“Premium eCall” (Push).
“Last Mile”- Integrated Route Guidance.

PSAP



Push Data from PSAP

Ambulance Team

Use GPS-Position from FSD to start route guidance

eCall Munich Test Site –„Premium eCall“ (Push). Lessons Learned.

- A Push-Solution is the PSAPs preference.
- Java-Spaces technology was proven viable for the eCall implementation. The upper protocol layer supports the remote invocation of the operations of the space API and the delivery of remote events from the space to the clients.
- The upper protocol uses a binary coding to reduce the amount of transmitted data (compared to XML coding used e.g. in web services). This enables the protocol to use slow GPRS communi-cation links.
- SSL protocol was used successfully to ensure confidential data communication and a closed user group based on a private/public key mechanism.
- The Push-solution increases complexity on PSAP level.
- “Last-Mile integration was proven valuable to avoid communication problems between PSAP and emergency personal. The solution is under further investigation from Bavarian Red Cross.
- The use of FSD GPS-data to generate an automatic route guidance could save time.

eCall Munich Test Site.
Wrap Up.

- Proof of Concept with different technical implementations was done.
- In all test-cases data availability on the eCall-Server didn't take longer than establishing the voice call connection. Time needed to determine PSAP based on national database may delay data availability.
- There was no significant problem with positioning accuracy and voice call establishment.
- eCall-Server and Service Provider concept could reduce complexity on PSAP-level which is important to get a fast European rollout.
- The communication channel needs further examination and standardization. Other transport channels (SMS, inband, DTMF) have not been evaluated.
- eCall vehicle integration was done using a mobile device as GSM/GPRS-modem. However this topic was not a main GST focus – other (embedded) solutions are possible.

Pan European eCall.
Current Standardization Activities.

- Standardization of Minimum Set of Data (MSD)
- Standardization of transport channel, Field test
- eCall Certification – conformance test specification
- Operational requirements for eCall / Third Party eCall

Questions ?

hans.michel@bmw.de