

Prehospital Telemedicine

VIMED® CAR 3

A telemedicine communication hub
for ambulance



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Figure 1: VIMED[®] CAR 3 (source: MEYTEC)

There exists a widespread rendezvous system in Germany which proposes a coordinated cooperation between paramedics and emergency doctors in case of emergency. The emergency doctors can usually rely on the pharmaceutical and diagnostic resources to ensure effective prehospital intervention. The emergency vehicles (depending on the specification) are also equipped with medical devices for diverse machine diagnostics

and /or treatment. This includes 12 – leads ECG device, systems for monitoring of diverse physiological parameters, devices which enables quick tests for blood sugar, drugs and medication as well as point-of-care testing for detection of heart attack. As a result the prehospital emergency services ensure the indication-specific emergency care of the acute patients, before their arrival into the specialized hospital.

Time to provision of the emergency care

The involvement of emergency doctors into rescue work is regulated in the indication catalogue of the emergency interventions. Therefore the emergency doctor should be alarmed especially if the vital functions of the

patient are significantly affected (Source: BÄK Online 2013). However, the emergency doctors can also be late on site, e.g. due to heavy traffic, distance to the operation site, especially in the rural areas, and/or by the occur-

rence of several emergency cases at the same time. The time to provision¹ of the emergency care in the emergency services in Germany are regulated and de-

termined by corresponding federal laws of the rescue services in each federal state.

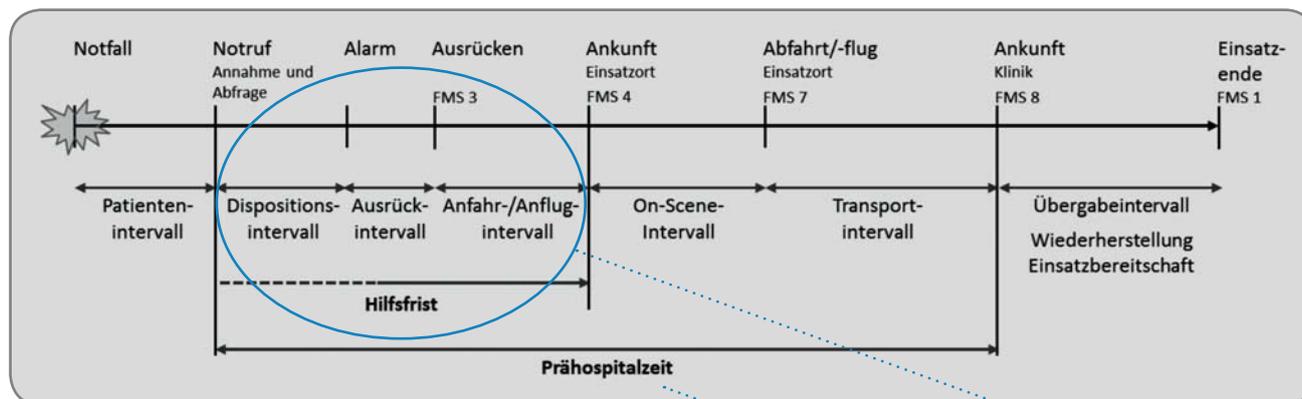


Figure 2: Emergency supply chain (source: Fischer et al. 2016:2)

Prehospital time

Time to provision care, incl. emergency call, alarm, move out

The timeframes for emergency services are regulated by law – depending on the individual German federal state – these vary from 8 minutes in the city area to the max. 17 minutes in the rural area (vgl. Paul / Sakschewski 2014: 185). But the actual reaction times usually differ from the required reaction times (Rettungsdienst.de Online 2016). In time critical emergency cases such as stroke and / or septic shock every time delay can significantly influence the outcome for the patient. Large time intervals between the clear diagnosis and the resulting implementa-

tion of the therapy, impact on the patient. Without the specialist's examination on site or the later intra-hospital transfers all of them prolong the health care supply times unnecessarily.

The telemedicine communication hub VIMED® CAR 3 can contribute to the significant stabilization and/or enhancement of the prehospital emergency services when it is integrated into the rescue chain of the emergency services.

VIMED® CAR 3 as a part of the complete solution

VIMED® CAR 3 is a telemedicine communication hub for ambulances. It is especially developed to support the time critical rescue missions of paramedics on site. The data will be communicated between the paramedics and the external medical specialists via mobile network. The VIMED® CAR 3 hub also allows the audiovisual communication with remote emergency doctors and/

or other medical specialists. VIMED® CAR 3 can also feed laboratory and vital data from the networked medical devices and send them into the electronic patient record. The telemedical cooperation can be built up with the tele-emergency-center or with individual first-aid-stations.

Benefits of VIMED® CAR 3

Robust and easy to service integration in the ambulance

The telemedicine system VIMED® CAR 3 fulfils the high requirements of robustness, stability and reliability when integrated in the operation of an ambulance. While integration into the ambulance at the time of building and fit-out is easier, through detailed coordination with the manufacturer. However the most significant advantage of VIMED® CAR 3 is that it can be retro fitted

to existing emergency vehicles. The integration includes installation of the several external LTE/UMTS/WiFi and GPS antennas as well as microphones. While in service the communication hub can be easily dismantled after release of the fixed connections. Such a service concept allows a high grade of the easy service integration.

¹The time to provision of care is a time frame, which starts with the receipt of the emergency message and ends with the arriving of the paramedics at the assistance site. Usually, it should be respected in 95% of all emergency cases (see Figure 2).

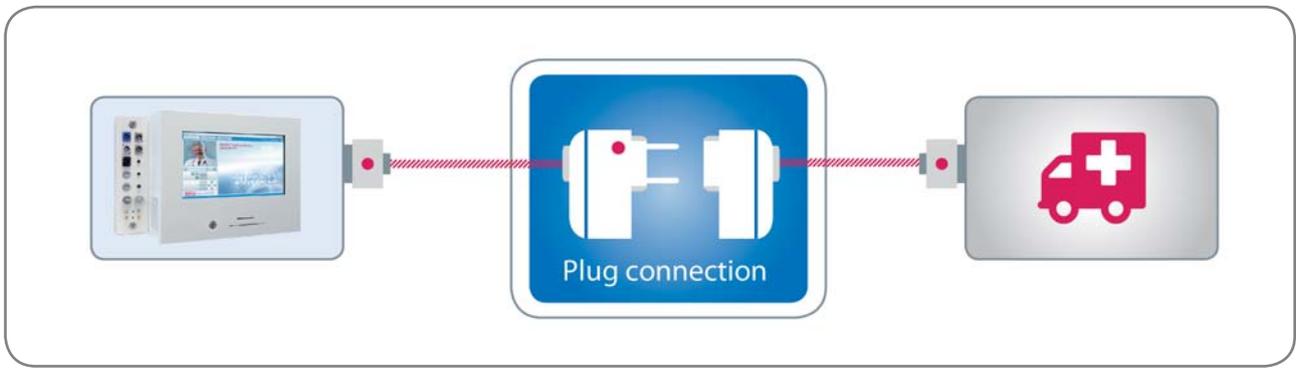


Figure 3: Easy to service integration in the ambulance (source: MEYTEC)

Audiovisual bidirectional communication of a high quality

The audiovisual communication between paramedics and, if applicable, patients in the ambulance with a remote medical specialist can be a real support for triage and clinical diagnosis. This service is readily available due to the communication hub VIMED® CAR 3, provided

that the doctor is also available. The feasibility of it was validated as a part of research projects². The recent state-of-the-art system provides even more quality in the field application.

Remote control of the high resolution PTZ-video camera

The ambulance has also a PTZ- video camera, which is a fixed installation in the ambulance and connected to the VIMED® CAR 3. The video camera can be panned, tilted or zoomed by a remote specialist from the hospital.

The high resolution lens as well as the 18x optical zoom features supports diagnostic and anamnesis in real time. It is also possible to integrate a second handheld video camera optionally.

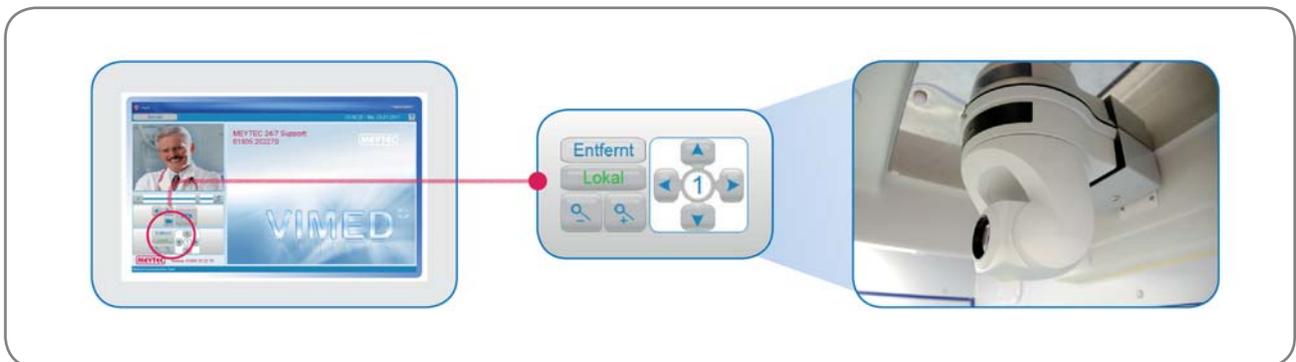


Figure 4: Remote control of the high resolution PTZ-video camera (source: MEYTEC)

High-end audio system

VIMED® CAR 3 is equipped with a high end audio system, which allows the paramedics hands free speaking and listening with remote doctor directly in the mobile examination room of the ambulance. The direct voice communication between the remote doctor and the patient could be also very helpful. The necessary microphones

and loud speakers are fixed inside of the mobile examination room. The echo cancelling as well as the reduction of other disturbing noises is largely achieved due to the integrated professional electronic systems. Alternatively a hands-free solution is also available.

Comfortable touch screen control

In case of the time critical emergency operations every technical detail should increase the efficiency of the complete solution. VIMED® CAR 3 is designed to control all processes of a teleconsultation easily and comfortably

via touchscreen. The control of the telemedical applications is transparent and self-descriptive. The capacitive touch screen, accommodates the wearing of medical gloves.

²<http://www.strokenet.de> (access on 10th February 2017)



Figure 5: Reduction of the disturbing noises with VIMED® CAR 3 (source: MEYTEC)

Connection of diverse diagnostic devices via LAN, WiFi or Bluetooth

VIMED® CAR 3 has integrated LAN, WiFi and Bluetooth interfaces through which the different medical diagnostic and lab devices can be connected allowing the diagnostic data to be transmitted from the ambulance into the external medical center of expertise. The diagnostic data is transferred automatically, as soon as the

device is switched on. Equipped with integrated card reader the communication hub allows an accurate pre-hospital recording of the electronic data of the patient and provided into the electronic patient record automatically.



Figure 6: VIMED® CAR 3 functional principle (source: MEYTEC³)

³Photo: MEYTEC GmbH, GS Elektromedizinische Geräte G. Stemple GmbH, Dрамиński S.A., medDV GmbH.

Data transmission into the hospital

All the relevant data of the diagnosis, i.e. patient data, can be recorded and transferred into a documentation system, e.g. telemedicine file. The data exchange happens quickly and it allows immediate evaluation by the

included and authorized doctor. The real-time teleconsultations, as well as the transfer of the other medical data, is secured by a reliable, state-of-the-art VPN- encryption technology for the transmission routes.

Bundling of several data transmission channels (Bonding-Method)

The reliable data transmission via VIMED® CAR 3 between authorized remote end-points is possible due to the bundling to improve the bandwidth of the data transmission channel. The Bonding-Method is an effective feature to use the data transmission channels from different providers of the mobile services simultaneously. As a result the highest possible data transfer rate required for real-time teleconsultations is achieved. The

ambulances equipped with the VIMED® CAR have a better chance to ensure the teleconsultation with emergency doctors and medical specialist, even if they are deployed in remote and/or rural areas. Additionally the special lights indicator in the cabin of the ambulance shows the real-time status of the available data network at all times.

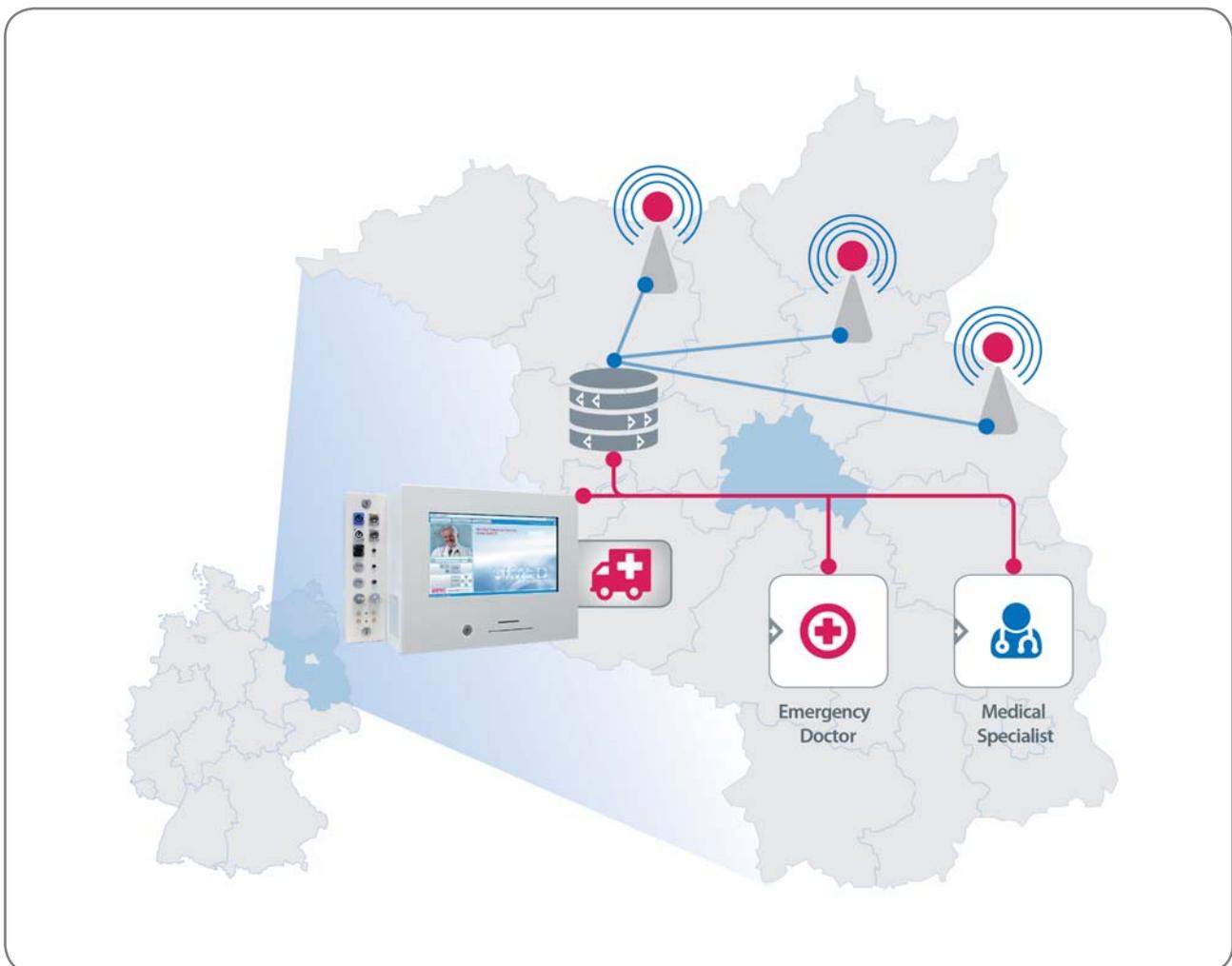


Figure 7: Bundling of data transmission channels from different providers of the mobile services (source: MEYTEC)

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Photo sources:

DRAMINKI S.A., GS Elektromedizinische Geräte G. Stemple GmbH, medDV GmbH, MEYTEC GmbH Informationssysteme

Please note: Pictures may differ from the original. Changes and mistakes reserve.

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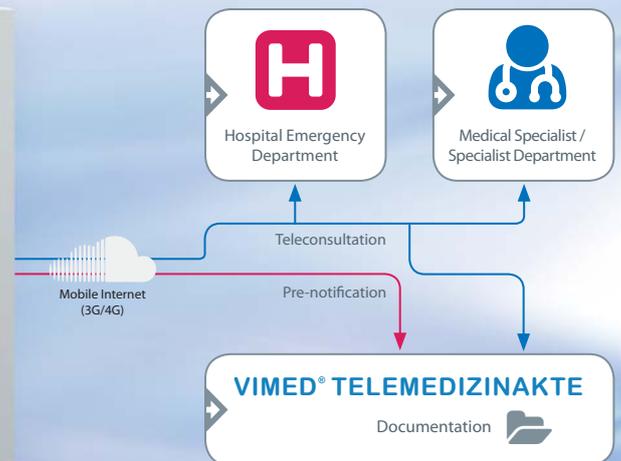
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Highlights

- ▶ Full telemedical connection for all available medical devices on VIMED® CAR 3
- ▶ Availability of specialist's examination on site via audiovisual bidirectional communication between doctor and patient/ rescue team
- ▶ Reduction of the disruptive noise through deployment of the professional echo-cancellation
- ▶ Bundling of several data transmission channels (Bonding-Method)
- ▶ Encrypted transmission of lab, vital signs, diagnostic and teleconsultation data
- ▶ Targeted selection and transfer of the patient to pre-notified specialist hospitals
- ▶ Robust design for the day-to-day deployment in the emergency service arena

Competence for Telemedicine and Medical Technology