NAEW&C FORCE
E-3A COMPONENT

Tactical Radios in the Fire Service

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SWAF

Tactical Communication Forum

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Table of content

- History of radio communication in the Fire Service
- Digital Trunked Radio in the Fire Service
- State of the Art communication in the Fire Service - using the example of a real NATO Fire Department operation
- Upcoming innovations in the field of communication at the NATO Fire Department

Digital Trunked Radio Fire Service

- History of radio communication in the Fire Service
  - - Analog radio has been in use in the Fire Service in Germany for 100 years
  - - Analogue radio was first used by the police after the First World War in 1919/20 - based on the experiences of the German Reichswehr
  - - The Magdeburg Fire Department was the first fire department in Germany to use radio technology as early as 1924

Digital Trunked Radio Fire Service

- Reasons for the introduction of Digital Trunked Radios in the Fire Service
  - European decision (Schengen Agreement)
  - Limited availability of frequencies
  - Digital trunked radio has significantly improved voice quality
  - Best possible communication inside and outside buildings
  - Ambient noise such as engine noise or pump noise is not transmitted
  - Built-in emergency call function with localization option
  - Tap-proof connection between the call partners
  - Cross-BOS* communication - one network for all BOS*

Digital Trunked Radio Fire Service

- BOS – Abbreviation for authorities and organizations with security tasks
  - Police
  - Customs
  - Emergency Medical Services
  - Fire Service
  - Technical Relief Agencies
  - Civil Protection Authorities
  - NATO Fire Department only by waiver through Federal Agencies for the purpose of inter-municipal cooperation

Digital Trunked Radio Fire Service

Operating organization

BDBOS — *Federal Agency*

↓

EADS — *System supplier*

↓

Coordinating body
Ministry of interior NRW — *State*

↓

Authorized body
State Office for Police Services NRW — *State*

Center of Excellence Digital Trunked Radio
State Fire School NRW

Tactital - technical operating agency — *County*

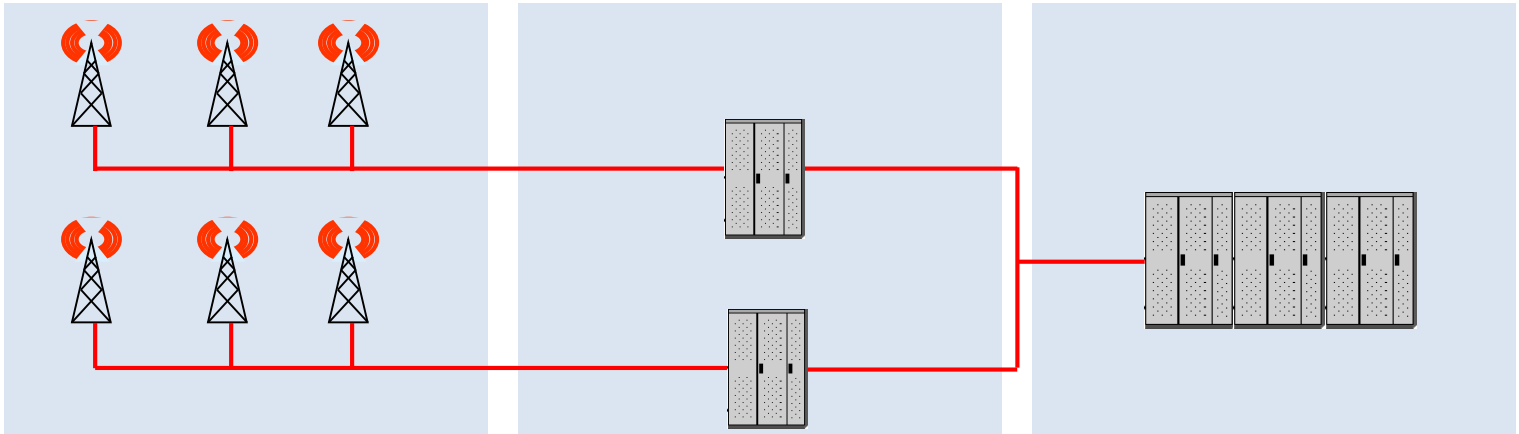
Maintaining agency — *County*

↓

Equipment | **Equipment** | **Equipment** — *Local Fire Service*

Digital Trunked Radio Fire Service

Components of the TETRA-BOS Network



BS
Base Station

Germany: 4.500 total

State NRW: 444 total

DXT
Switchboard

Germany: 65 total

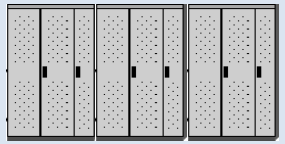
State NRW: 9 total

DXTT
Transit Switchboard

Germany: 4 total

Digital Trunked Radio Fire Service

Components of the TETRA-BOS Network



DXTT
Transit Switchboard

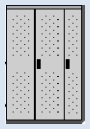
Germany: 4 total

Task of the Transit Switchboards:

- Bundle and manage the switchboards
- for large networks several transit switchboards can be interconnected

Digital Trunked Radio Fire Service

Components of the TETRA-BOS Network



DXT
Switchboard

Germany: 65 total

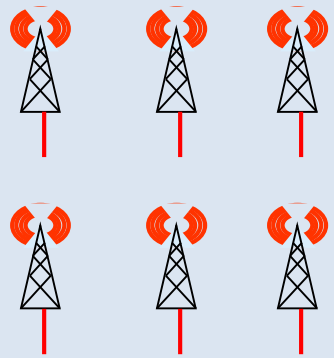
State NRW: 9 total

Task of the Switchboards:

- Deposit of the essential functionalities of the digital radio network
- Connection to facilities with administrative rights
- Connection to higher-level transit switchboards
- Administration of up to 128 base stations and 256 workstations for network management

Digital Trunked Radio Fire Service

Components of the TETRA-BOS Network



BS
Base Station

Germany: 4.500 total

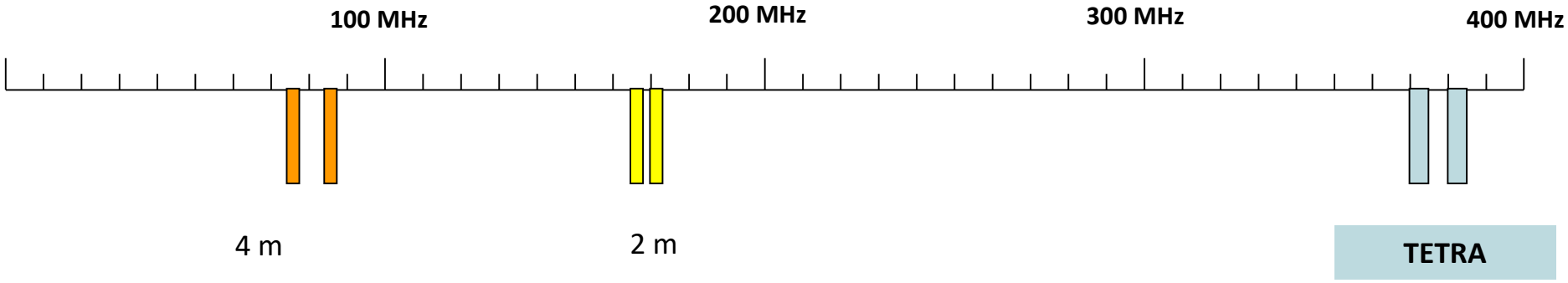
State NRW: 444 total

Task of the Base Stations:

- Components: Radio transceiver (TRX), Control component, Antenna matching, Power supply / Emergency power supply, GPS, Interface to the fixed network infrastructure
- Each radio transceiver provides 1 carrier frequency with 4 timeslots, 1 Base Station can have multiple radio transceivers
- 1 timeslot generally for organizational purposes

Digital Trunked Radio Fire Service

Classification of the BOS frequency range



		from	until	Channel
4 m	Lower range Upper range	74,215 MHz 84,015 MHz	77,475 MHz 87,255 MHz	from 347 to 510 **164 useable channels**
2 m	Lower range Upper range	165,210 MHz 169,380 MHz	169,810 MHz 173,980 MHz	from 01 to 125 **117 useable channels**
Digital	Uplink Downlink	380,000 MHz 390,000 MHz	385,000 MHz 395,000 MHz	N/A

Digital Trunked Radio Fire Service

	Time-Slot	Timeslot occupation
TRX 1	1	Organisation
	2	Pol / Tech. / Fire Service / EMS / Customs / Fire Service
	3	Police / Federal Police / Customs
	4	Technical Relief / Technical Relief
TRX 2	5	Fire Service
	6	EMS
	7	EMS
	8	German Live Saving Society

Time process ---------->

Police
Customs
Federal Police
German LSS
Fire Service
Technical Relief
EMS

*TRX = Radio transceiver

Digital Trunked Radios Overview

Handheld Radio Terminal
HRT (portable)

Mobile Radio Terminal
MRT (vehicle mounted)

Fixed Radio Terminal
FRT (Dispatch Center)

Digital Trunked Radios Overview

Handheld Radio Terminal HRT (portable)

- Belongs to the equipment of each squad or unit leader
- Can be used for on-scene communication as well as for communication with the Dispatch Center
- Transmitting power is lower than with the MRT

Mobile Radio Terminal MRT (vehicle mounted)

- Belongs to the equipment of each vehicle in the fire service
- Can be used for on-scene communication as well as for communication with the Dispatch Center
- Transmitting power is higher than with the HRT

Fixed Radio Terminal FRT (Dispatch Center)

- Is preferably used in Dispatch Centers
- Used primarily for the communication between the Dispatch Center and the Incident Commander/Vehicles
- Transmitting power is higher than with the MRT

Digital Trunked Radio Fire Service

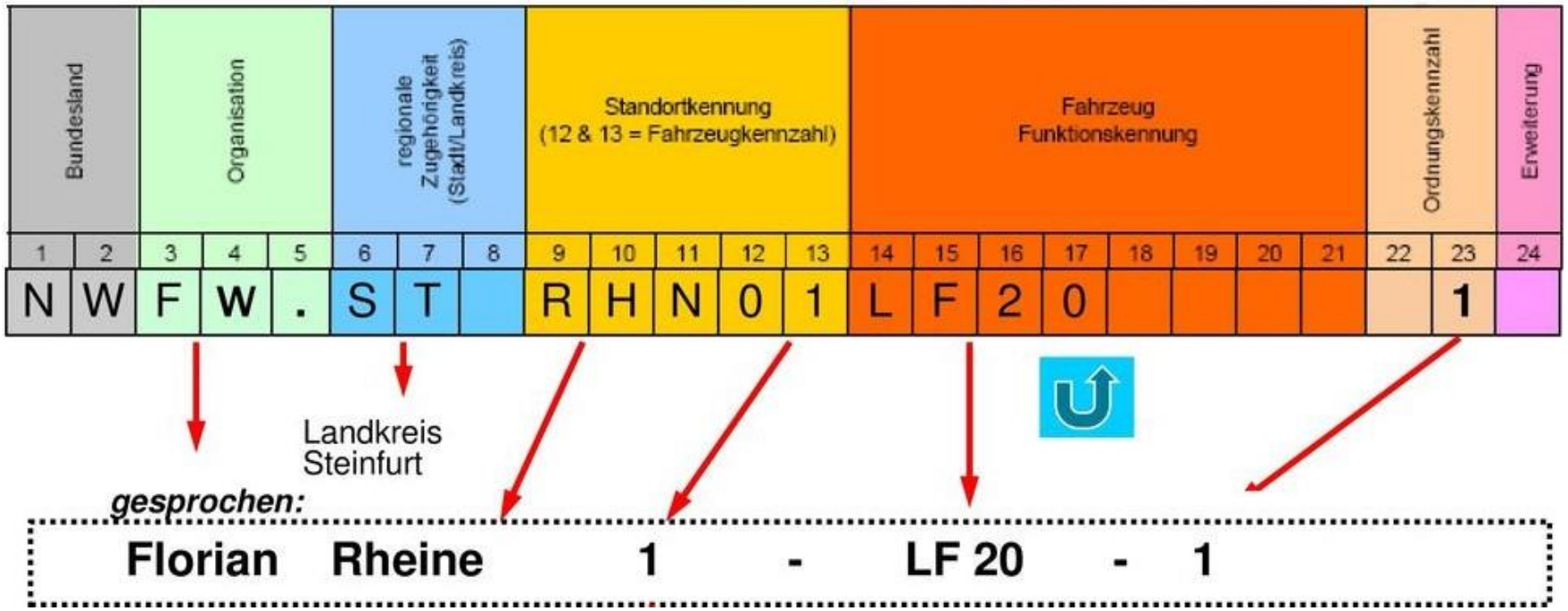
BOS – Security Simcard

The BOS – Security Simcard combines the following functions:

- Network access authorization
- End to end encryption
- Data storage
- Tactical function (OPTA = Operational – tactical adress)

Digital Trunked Radio Fire Service

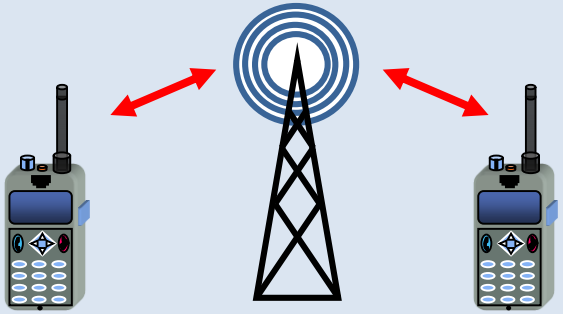
OPTA – Operational-tactical adress



Digital Trunked Radio Fire Service

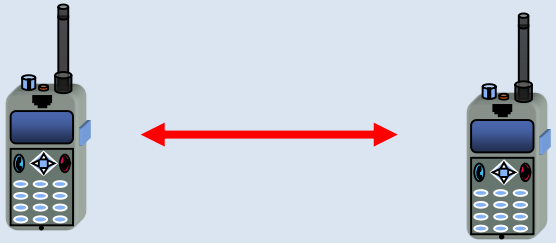
- There are two different operation modes in Digital Trunked Radio operations:

TMO
Trunked **M**ode **O**peration



- Group call
- Individual call
- Emergency call
- Gateway

DMO
Direkt **M**ode **O**peration



- Group call
- Individual call
- Emergency call
- Repeater

Digital Trunked Radio Fire Service

Operation mode TMO

Trunked Mode Operation

- Establishing a radio connection between one or more radio subscribers by using the network infrastructure
- Individual call (direct call): Targeted call setup from or to one subscriber
- Group Call: Call of a specific group of subscribers
- In TMO, different frequencies are used than in DMO

Digital Trunked Radio Fire Service

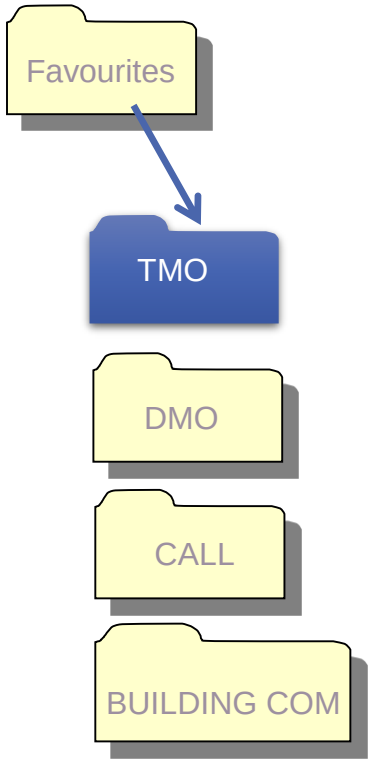
Operation mode DMO

Direct Mode Operation

- DMO refers to direct communication between several MRT/HRT without access to the network
- This mode becomes necessary at the latest in the event of failure or non-existent infrastructure. It can therefore also be used outside the range of a base station
- In TMO, fundamentally different frequencies are used than in DMO

Digital Trunked Radio Fire Service

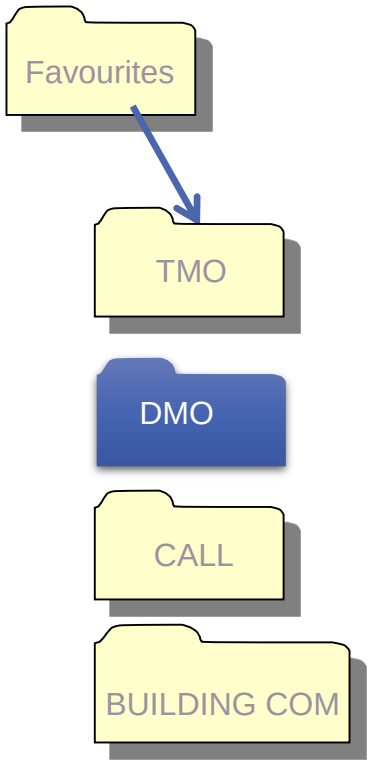
Fleetmaping



Favoriten	Ordner
TMO	Ordner
HS_Anruf	TMO Gesprächsgruppe
HS_BOS	TMO Gesprächsgruppe
HS_Fw	TMO Gesprächsgruppe
HS_WerkFeu	TMO Gesprächsgruppe
HS_RD	TMO Gesprächsgruppe
HS_RD-Son	TMO Gesprächsgruppe
HS_KatS	TMO Gesprächsgruppe
HS_HiOrg	TMO Gesprächsgruppe
HS_HS	TMO Gesprächsgruppe
HS_ERZ	TMO Gesprächsgruppe
HS_GAN	TMO Gesprächsgruppe
HS_GEI	TMO Gesprächsgruppe
HS_HSB	TMO Gesprächsgruppe
HS_HÜH	TMO Gesprächsgruppe
HS_SFK	TMO Gesprächsgruppe
HS_ÜBP	TMO Gesprächsgruppe
HS_WGB	TMO Gesprächsgruppe
HS_WLF	TMO Gesprächsgruppe
HS_WSB	TMO Gesprächsgruppe

Digital Trunked Radio Fire Service

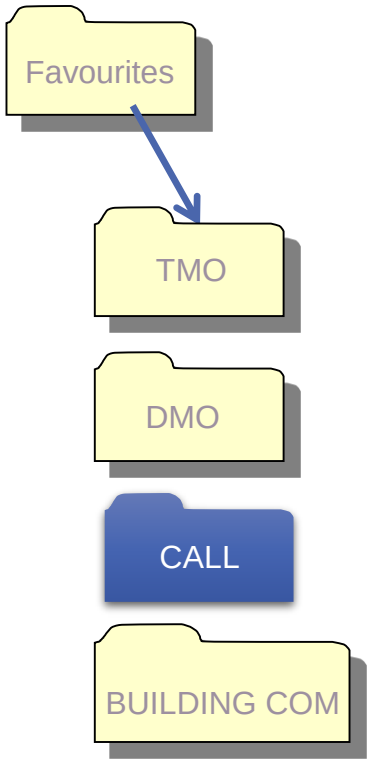
Fleetmaping



Favoriten	Ordner
TMO	Ordner
DMO	Ordner
316_F*	DMO Gesprächsgruppe
315_F*	DMO Gesprächsgruppe
314_F*	DMO Gesprächsgruppe
313_F*	DMO Gesprächsgruppe
312_F*	DMO Gesprächsgruppe
311_F*	DMO Gesprächsgruppe
310_F*	DMO Gesprächsgruppe
309_F*	DMO Gesprächsgruppe
308_F*	DMO Gesprächsgruppe
307_F*	DMO Gesprächsgruppe
Marschkanal*	DMO Gesprächsgruppe
603_R*	DMO Gesprächsgruppe
604_R*	DMO Gesprächsgruppe
605_R*	DMO Gesprächsgruppe
606_R*	DMO Gesprächsgruppe
607_R*	DMO Gesprächsgruppe

Digital Trunked Radio Fire Service

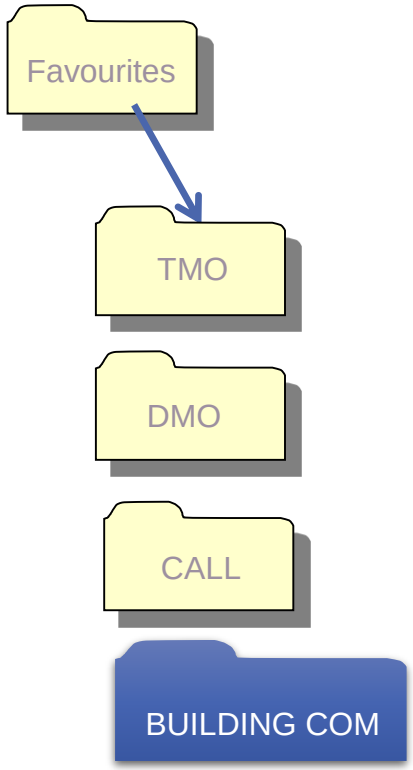
Fleetmaping



Favoriten	Ordner
TMO	Ordner
DMO	Ordner
ANRUF	Ordner
AC_Anruf	TMO Gesprächsgruppe
D_Anruf	TMO Gesprächsgruppe
DN_Anruf	TMO Gesprächsgruppe
EU_Anruf	TMO Gesprächsgruppe
HS_Anruf	TMO Gesprächsgruppe
K_Anruf	TMO Gesprächsgruppe
MG_Anruf	TMO Gesprächsgruppe
NE_Anruf	TMO Gesprächsgruppe
VIE_Anruf	TMO Gesprächsgruppe
BM_Anruf	TMO Gesprächsgruppe

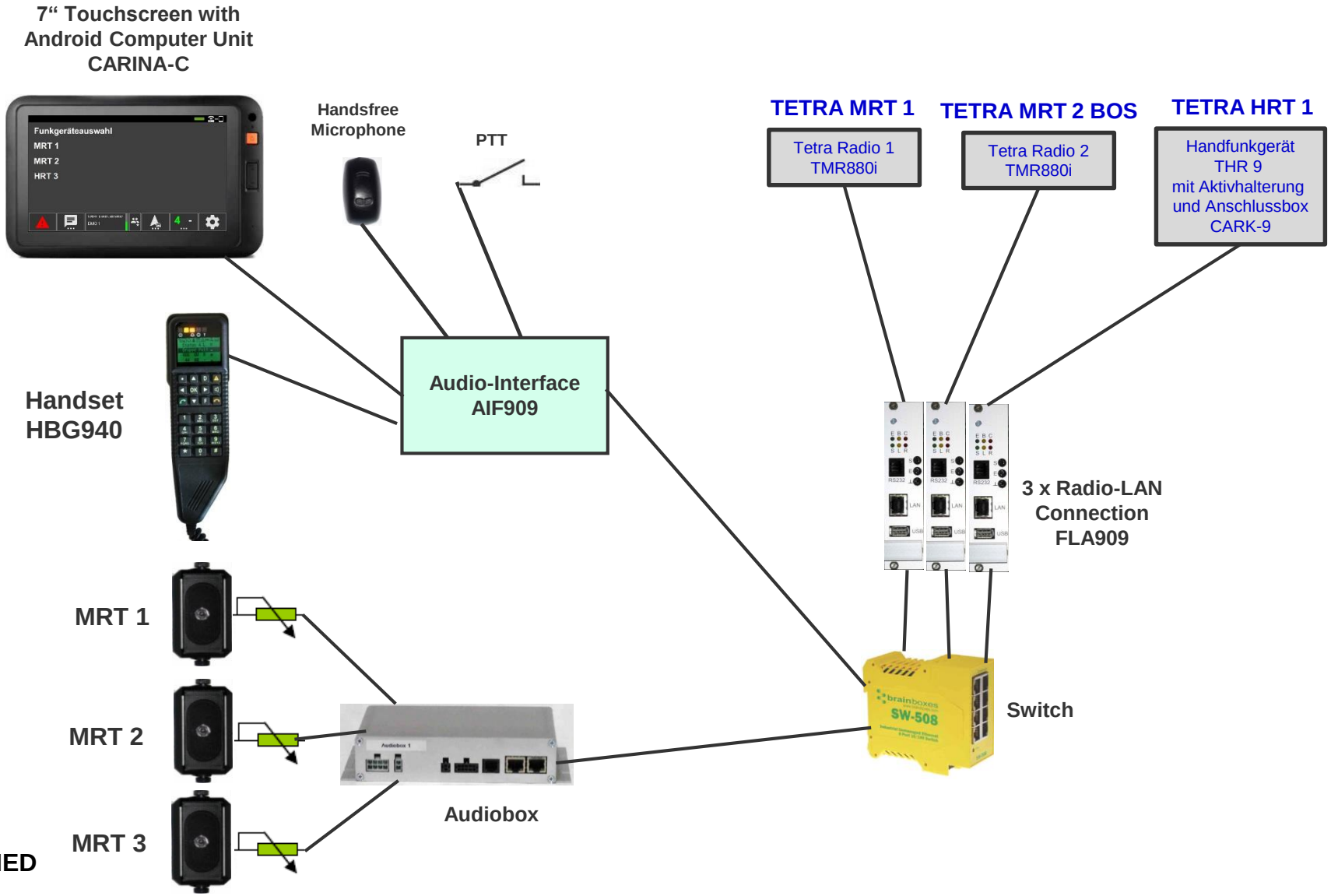
Digital Trunked Radio Fire Service

Fleetmaping



Favoriten	Ordner
TMO	Ordner
DMO	Ordner
ANRUF	Ordner
OBJEKTFUNK	Ordner
OV_210_TMOa	TMO Gesprächsgruppe
OV_209_TMOa	TMO Gesprächsgruppe
OV_208_TMOa	TMO Gesprächsgruppe
OV_207_TMOa	TMO Gesprächsgruppe
OV_206_TMOa	TMO Gesprächsgruppe
OV_205_TMOa	TMO Gesprächsgruppe
OV_204_TMOa	TMO Gesprächsgruppe
OV_203_TMOa	TMO Gesprächsgruppe
OV_202_TMOa	TMO Gesprächsgruppe
OV_201_TMOa	TMO Gesprächsgruppe
OV_110_TMOa	TMO Gesprächsgruppe
OV_109_TMOa	TMO Gesprächsgruppe
OV_108_TMOa	TMO Gesprächsgruppe
OV_107_TMOa	TMO Gesprächsgruppe
OV_106_TMOa	TMO Gesprächsgruppe
OV_105_TMOa	TMO Gesprächsgruppe
OV_104_TMOa	TMO Gesprächsgruppe
OV_103_TMOa	TMO Gesprächsgruppe
OV_102_TMOa	TMO Gesprächsgruppe
OV_101_TMOa	TMO Gesprächsgruppe
OV_Reserve	DMO Gesprächsgruppe
OV_A	DMO Gesprächsgruppe
OV_6	DMO Gesprächsgruppe
OV_5	DMO Gesprächsgruppe
OV_4*	DMO Gesprächsgruppe
OV_3	DMO Gesprächsgruppe
OV_2	DMO Gesprächsgruppe
OV_1*	DMO Gesprächsgruppe

Schematic view radio system



FMS* Status Indicator

FMS STATUS	MEANING
1	Vehicle on the move; ready for emergencies
2	Vehicle at the Station; ready for emergencies
3	Vehicle takes over emergency; heading to incident site
4	Vehicle arrived at the incident site
5	Request for communication with Dispatch Center
6	Vehicle out of service
7	Patient on board; on the way to hospital (EMS)
8	Patient off board; arrived at the hospital (EMS)
9	Request for registration at external Dispatch Center
0	Prioritized request for communication with Dispatch Center

*FMS = Radio Message System

Handling an emergency call

- Using an example of a recent incident executed by the NATO Fire Department
- Automatic Fire Alarm in Aircraft Hangar I, Smoke detection system triggered, Hangar occupied with one aircraft
- Based on pre-determined Alert- & Response Order the remaining forces of the Fire Service have to respond to the reported incident

Upcoming innovations NATO FD

Frisbee Tower

VHF COM

Transponder (SQUAWK)

DTR NATO

Emergency Hand Signals

NATO Fire Department

Upcoming innovations

Frisbee Tower

VHF COM

Transponder (SQUAWK)

DTR NATO

Interphone / Headset

NATO Fire Department

Flight Interphone

Service Interphone

Pilot Call

Upcoming innovations NATO FD

Frisbee Tower

VHF COM

Transponder (SQUAWK)

DTR NATO

LED Matrix RESCUE 1

NATO Fire Department

RTK SL 6	Infomatrix Front / Heck
EVACLR	Evac Left / Right
EVACL	Evacuate Left
EVACR	Evacuate Right
AIRSAF	Aircraft Safe
ALLCLR	All Clear
SHDWN	Shut Down
HLDPOS	Hold Position
NOFIRE	No Fire
BRKSHT	Brakes Hot
ENFIRE	Engine Fire
STAIRS	Stairs in Place
INTERCOM	Intercom

Upcoming innovations NATO FD

Frisbee Tower

VHF COM

Transponder (SQUAWK)

DTR NATO

Rescue Frequency Geilenkirchen Rescue

VHF COM 121.555 MHZ

NATO Fire Department