



**Digital Two-Way Radio System for the G8 Annual Summit 2007 in Heiligendamm  
Berlin, November 19, 2007**

## **Speaker:**

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Responsible for the budget of the Neubrandenburg Police Authority

Responsible for Information & Communication, Police Technology and Economic Administration

Director of Subsection of Radio and Digital Radio Project Manager during the G8 Summit

## Outline

1. Introduction
2. Concept/Design
3. Technical implementation
4. Application

# Tetra4MV

## Timeline - 2006

September	2006	Basic definition of tactical requirements for a digital two-way radio network and cost analysis
November	2006	Compilation of tactical requirements
Dezember	2006	Tactical certification by BAO KAVALA Publication of tender Bidder inquiries

## Timeline – 2007

January	2007	Proposal for leasing of the first 9 base stations Supply of the required HH-resources Application of the BOS digital radio frequencies 29.01.07 order to Motorola
February	2007	Application of the data lines Start training operating personnel (Radio control station terminals)
March	2007	Leasing of 8 additional base stations Leasing of backup radio stations

## Procedure – 2007

April	2007	04/02/2007 Finalise system design of the anchor locations Award of contract Leasing of antennae locations, start of multiplier training
May	2007	Acceptance for operation Receipt of the frequency license Initial operation of all base stations

## 2. Concept/Design

### **Design for the information and telecommunications technology center - technical assurance within G8 budget (Jan/Feb 2006)**

- Deliberations with police and mission sections leaders
- Collation of tactical information
- Formulation of rough design
- Creation of technical structures, capacities and components
- Formulation of verifiable financial numbers

**Suspension of planning due to the state visit of George W. Bush**



## **Mandate:**

### Operational area:

- Around Heiligendamm with the boundaries of Wismar, Parchim, Güstrow, Ribnitz-Damgarten and 12 nautical miles along the coastline

### Executive staff and commands of mission sections:

- 12 mission sections, approx. 40 mission subsections
- Common location of executive staff and the commands of 10 mission sections (Waldeck)
- 2 remote commands of EA Heiligendamm and Airport

## Commitment of forces:

- Overall forces approx. 17,000 mission workers
- Requirement of approx. 250 to 300 talk groups (police only)

## Quantity structure:

- 2 command & control stations with a total of 4 coordinating office work stations
- 3 mobile base stations mounted on motor vehicles
- 2100 terminals
- Accessories

In the design phase the terminal requirement was subject to strong fluctuations, so that optional requirements of up to 15% were provided in the specifications.

## Defined operational area

Area approx. 9200 km<sup>2</sup>

(more than 3-times the area of  
Saarland)

Required area with portable radio  
coverage

(real portable radio coverage in  
approx. 80% of the total  
operational area)



## Existing infrastructure

- analog common frequency with two layers in the area of operation
- Use by AAO and BAO loss conditions / terror
- 3 regional analog special repeaters in the city of Rostock
- 1 LUKW in the state of Mecklenburg Vorpommern

## Requirements for the mission

- approx. 70 radio circuits available in the overall area of operation  
→ ***equivalent to 70 analog common-frequency layers***
- 180 to 230 regional repeaters supported radio channels and alternating voice channels, overlapping in the areas of Heiligendamm, Rostock and Laage airport

# Decision for digital radio

## Why?

- Required number of analog radio channels was neither technically nor economically feasible
- Concentration of transmitting / receiving stations in the closest area
- Transhorizon ranges
- Analog radio with simple technical resources can be bugged and disrupted
- Poor voice and transmission quality = additional stress for the mission force

## Digital radio to what extent?

→ *Less is sometimes more*

→ For closed units principally, from the Police Leader to the leaders of around one hundred police

- Receipt of the communications structures and workflows
- Change digital to analog where **otherwise change 4m to 2m**
- Logistics
- Training problem

→ In selected areas personnel or vehicle equipment

→ Priority restriction to group communication

→ GPS and emergency call capability

## 3. Technical implementation

### ■ Frequency design

- Frequency application
- Site certification

### ■ Documentation

- Communications plan
- Fleet mapping

### ■ Boosting site efficiency

- Site acquisition
- BTB
- Setup of the antennae systems
- Site acceptance

### ■ Site connection

- Network design
- Wired connections
- Directional radio connections

### ■ Delivery/setup of the system technology

- MSC/ NMC
- Base stations
- Control stations
- Terminals/accessories

### ■ Training

- Technical personnel
- Control station personnel
- Multipliers for users

## Frequency planning

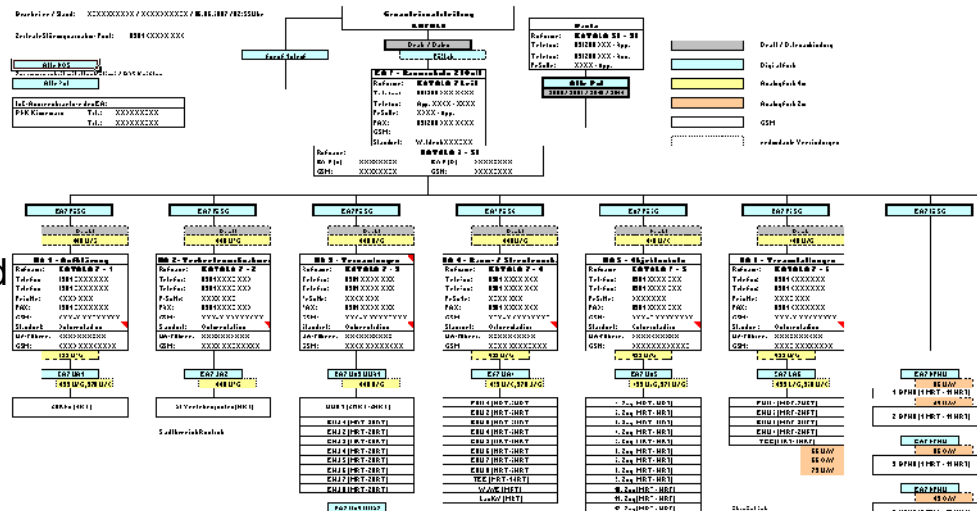
- Calculation of the frequency requirement on the basis of the numbers of carriers (76) and the repeating options
- Exclusive frequencies for the mBS
- Application for the frequency license with BMI (Fed. Min. of Interior)
- Testing and implementation to Federal Police Center for Information and Communication specifications
- Bilateral frequency coordination with Denmark
- Receipt of the frequency license from the Federal Network Agency
- Filing and receipt of the site certification through the site owner



# Documentation

## Communications plan

- Implementation of the mission and command
- Diagram of information relationships
- Covering operations area



## Fleet mapping

- Created on the basis of the communications plan
- 200 police talk groups and 90 NipoG talk groups arranged
  - to enable flexible reaction on changes during the mission
- Matrix of the allocation of all terminals by their respective authorization and role
  - predominant number of the terminals with equivalent authorizations
  - additional talk groups only allowed in the upper leadership levels and for special users

## Boosting site efficiency

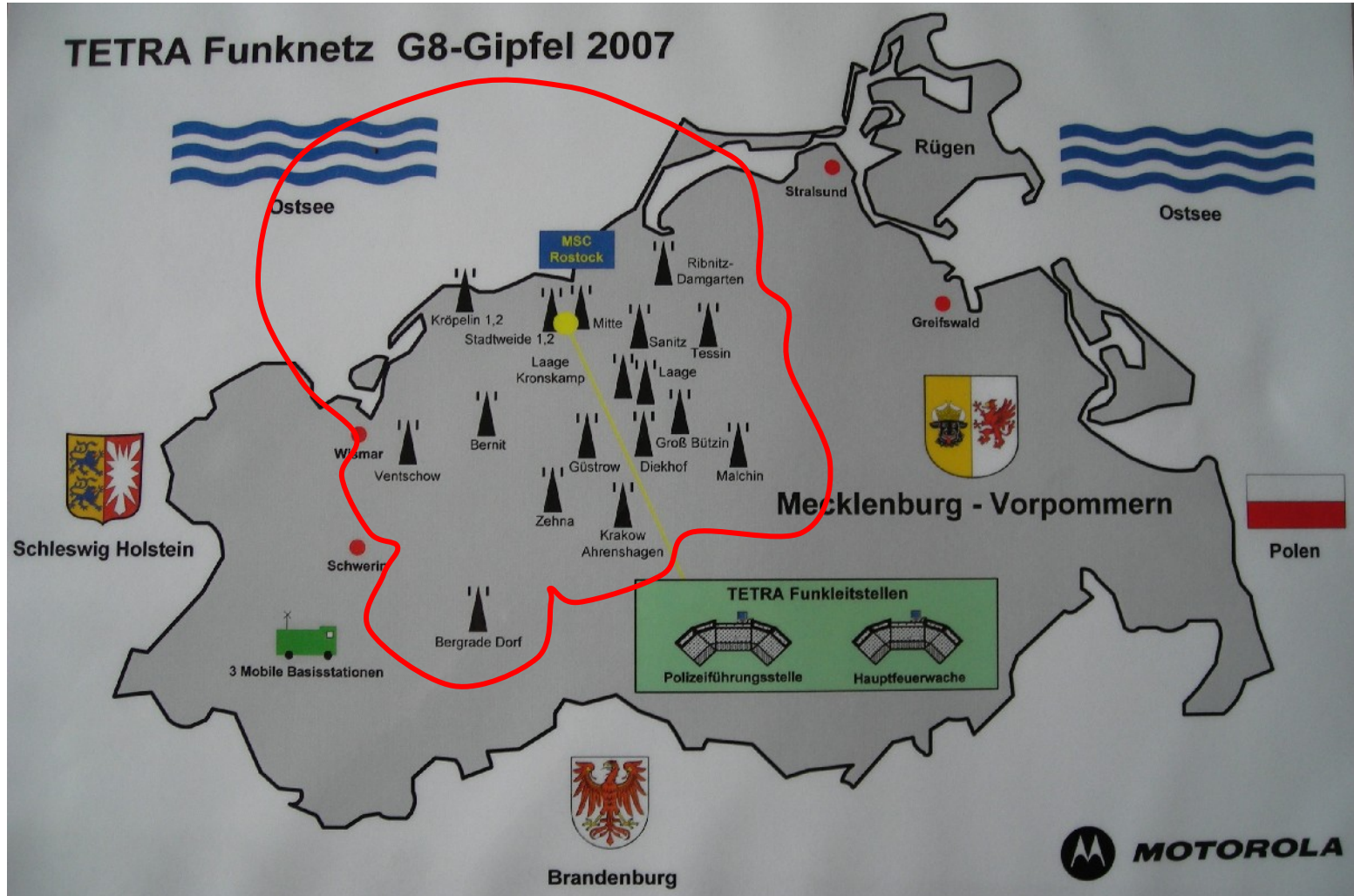
- 9 anchor sites specified on exposed radio towers
  - Inclusion of the antennae systems in boosting of site efficiency
  - Chronological flow at anchor sites
  - 2 sites with 2 base stations (redundancy)
- 8 additional sites for covering the supply assignment and increase of redundancy
- Site preparations for MSC/NMC (climate control, emergency power, security)

## Site connection

- Connection of all 17 BS-sites and 2 control centers to the MSC
  - 16 sites via E1-cable, 1 site via  $\mu$ -wave
- Use of the DVZ - network as backbone
- Redundant directional radio connection of 3 base stations
- Redundant connection of the DVZ-network to the MSC via directional radio
- Wiring of ISDN-connections for the mobile base stations

## **Delivery / setup of the system technology**

- Test run in Berlin (Factory Acceptance Test)
- Commissioning of the MSC/NMC
- Commissioning of 19 base stations
- Commissioning of 4 control center terminals
- Commissioning of mBS in Neubrandenburg in stand alone operation
- Commissioning of two mBS in Schwerin and Wismar via ISDN - links (prepared sites)
- Delivery of the terminals and accessories in coordinated intervals



## Training

- Technical personnel (15 participants) received two weeks of training (network structure, individual user management, control center terminals, terminal programming)
- Control centre personnel (8 participants) two days of training
- Multipliers (15 participants) for terminals trained for one day
  - ▲ all training was performed by the system technology vendor

User instruction was provided on site by the technical personnel of BOS or by the multipliers

**April 2, 2007 – Begin pilot operation**

**May 1 – Begin functional operation**

**Network operation and maintenance**

- by Motorola
- 3 employees of Motorola

**Individual user management/ terminal programming / installation**

- by technical Information and Communications personnel of the M-V State Police
- Network monitoring
- Terminal distribution and vehicle installation
- Deployment of mobile base stations

## 4. Application

### Temporary network expansions with mobile base stations

- Deployment of the mobile base stations for coverage of the unpredictable requirements for the special events in Schwerin and Wismar
- Setup of stationary antennae
- Connection of the mBS by means of ISDN



## Utilized capacity / load distribution

- Main location Rostock (12 carriers) and Kröpelin (8 carriers) were suitable for the heavy traffic load
- In the area of Laage airport (multiple sites with 2 carriers)
  - maximum load was reached while the guest arrived
  - temporary capacity of 2 sites extended to 3 carriers each
- In the outskirts, 2 carriers per site were sufficient
- Specifications of criteria for terminal log-in can optimize the load distribution

## User acceptance

Consistently positive feedback due to high availability and uncomplicated operation

- somewhat affected lower variety of accessories
- In contrast to the terminals, there were rarely any requisition notes in advance here
- the specific need was first formulated during application
- adaptations were necessary for quickly obtained accessories

## Service

- in order to prevent long periods of interference, the parallel inclusion of all components possibly affected by the disruption was necessary
- a central location for the coordination and monitoring of all troubleshooting was valuable
- on site service of the network operator is indispensable for such applications



# Application





# Application



**Application**





## Application



Grid view m01 % Zonen #1 - ZONE M01

Zone	Code	Code	Code	Code	Code	Code	Code	Code	Code
Zone 1	0001	0002	0003	0004	0005	0006	0007	0008	0009
Zone 2	0010	0011	0012	0013	0014	0015	0016	0017	0018
Zone 3	0019	0020	0021	0022	0023	0024	0025	0026	0027
Zone 4	0028	0029	0030	0031	0032	0033	0034	0035	0036
Zone 5	0037	0038	0039	0040	0041	0042	0043	0044	0045
Zone 6	0046	0047	0048	0049	0050	0051	0052	0053	0054
Zone 7	0055	0056	0057	0058	0059	0060	0061	0062	0063
Zone 8	0064	0065	0066	0067	0068	0069	0070	0071	0072
Zone 9	0073	0074	0075	0076	0077	0078	0079	0080	0081
Zone 10	0082	0083	0084	0085	0086	0087	0088	0089	0090
Zone 11	0091	0092	0093	0094	0095	0096	0097	0098	0099
Zone 12	0100	0101	0102	0103	0104	0105	0106	0107	0108
Zone 13	0109	0110	0111	0112	0113	0114	0115	0116	0117
Zone 14	0118	0119	0120	0121	0122	0123	0124	0125	0126
Zone 15	0127	0128	0129	0130	0131	0132	0133	0134	0135
Zone 16	0136	0137	0138	0139	0140	0141	0142	0143	0144
Zone 17	0145	0146	0147	0148	0149	0150	0151	0152	0153
Zone 18	0154	0155	0156	0157	0158	0159	0160	0161	0162
Zone 19	0163	0164	0165	0166	0167	0168	0169	0170	0171
Zone 20	0172	0173	0174	0175	0176	0177	0178	0179	0180
Zone 21	0181	0182	0183	0184	0185	0186	0187	0188	0189
Zone 22	0190	0191	0192	0193	0194	0195	0196	0197	0198
Zone 23	0199	0200	0201	0202	0203	0204	0205	0206	0207
Zone 24	0208	0209	0210	0211	0212	0213	0214	0215	0216
Zone 25	0217	0218	0219	0220	0221	0222	0223	0224	0225
Zone 26	0226	0227	0228	0229	0230	0231	0232	0233	0234
Zone 27	0235	0236	0237	0238	0239	0240	0241	0242	0243
Zone 28	0244	0245	0246	0247	0248	0249	0250	0251	0252
Zone 29	0253	0254	0255	0256	0257	0258	0259	0260	0261
Zone 30	0262	0263	0264	0265	0266	0267	0268	0269	0270
Zone 31	0271	0272	0273	0274	0275	0276	0277	0278	0279
Zone 32	0280	0281	0282	0283	0284	0285	0286	0287	0288
Zone 33	0289	0290	0291	0292	0293	0294	0295	0296	0297
Zone 34	0298	0299	0300	0301	0302	0303	0304	0305	0306
Zone 35	0307	0308	0309	0310	0311	0312	0313	0314	0315
Zone 36	0316	0317	0318	0319	0320	0321	0322	0323	0324
Zone 37	0325	0326	0327	0328	0329	0330	0331	0332	0333
Zone 38	0334	0335	0336	0337	0338	0339	0340	0341	0342
Zone 39	0343	0344	0345	0346	0347	0348	0349	0350	0351
Zone 40	0352	0353	0354	0355	0356	0357	0358	0359	0360
Zone 41	0361	0362	0363	0364	0365	0366	0367	0368	0369
Zone 42	0370	0371	0372	0373	0374	0375	0376	0377	0378
Zone 43	0379	0380	0381	0382	0383	0384	0385	0386	0387
Zone 44	0388	0389	0390	0391	0392	0393	0394	0395	0396
Zone 45	0397	0398	0399	0400	0401	0402	0403	0404	0405
Zone 46	0406	0407	0408	0409	0410	0411	0412	0413	0414
Zone 47	0415	0416	0417	0418	0419	0420	0421	0422	0423
Zone 48	0424	0425	0426	0427	0428	0429	0430	0431	0432
Zone 49	0433	0434	0435	0436	0437	0438	0439	0440	0441
Zone 50	0442	0443	0444	0445	0446	0447	0448	0449	0450
Zone 51	0451	0452	0453	0454	0455	0456	0457	0458	0459
Zone 52	0460	0461	0462	0463	0464	0465	0466	0467	0468
Zone 53	0469	0470	0471	0472	0473	0474	0475	0476	0477
Zone 54	0478	0479	0480	0481	0482	0483	0484	0485	0486
Zone 55	0487	0488	0489	0490	0491	0492	0493	0494	0495
Zone 56	0496	0497	0498	0499	0500	0501	0502	0503	0504
Zone 57	0505	0506	0507	0508	0509	0510	0511	0512	0513
Zone 58	0514	0515	0516	0517	0518	0519	0520	0521	0522
Zone 59	0523	0524	0525	0526	0527	0528	0529	0530	0531
Zone 60	0532	0533	0534	0535	0536	0537	0538	0539	0540
Zone 61	0541	0542	0543	0544	0545	0546	0547	0548	0549
Zone 62	0550	0551	0552	0553	0554	0555	0556	0557	0558
Zone 63	0559	0560	0561	0562	0563	0564	0565	0566	0567
Zone 64	0568	0569	0570	0571	0572	0573	0574	0575	0576
Zone 65	0577	0578	0579	0580	0581	0582	0583	0584	0585
Zone 66	0586	0587	0588	0589	0590	0591	0592	0593	0594
Zone 67	0595	0596	0597	0598	0599	0600	0601	0602	0603
Zone 68	0604	0605	0606	0607	0608	0609	0610	0611	0612
Zone 69	0613	0614	0615	0616	0617	0618	0619	0620	0621
Zone 70	0622	0623	0624	0625	0626	0627	0628	0629	0630
Zone 71	0631	0632	0633	0634	0635	0636	0637	0638	0639
Zone 72	0640	0641	0642	0643	0644	0645	0646	0647	0648
Zone 73	0649	0650	0651	0652	0653	0654	0655	0656	0657
Zone 74	0658	0659	0660	0661	0662	0663	0664	0665	0666
Zone 75	0667	0668	0669	0670	0671	0672	0673	0674	0675
Zone 76	0676	0677	0678	0679	0680	0681	0682	0683	0684
Zone 77	0685	0686	0687	0688	0689	0690	0691	0692	0693
Zone 78	0694	0695	0696	0697	0698	0699	0700	0701	0702
Zone 79	0703	0704	0705	0706	0707	0708	0709	0710	0711
Zone 80	0712	0713	0714	0715	0716	0717	0718	0719	0720
Zone 81	0721	0722	0723	0724	0725	0726	0727	0728	0729
Zone 82	0730	0731	0732	0733	0734	0735	0736	0737	0738
Zone 83	0739	0740	0741	0742	0743	0744	0745	0746	0747
Zone 84	0748	0749	0750	0751	0752	0753	0754	0755	0756
Zone 85	0757	0758	0759	0760	0761	0762	0763	0764	0765
Zone 86	0766	0767	0768	0769	0770	0771	0772	0773	0774
Zone 87	0775	0776	0777	0778	0779	0780	0781	0782	0783
Zone 88	0784	0785	0786	0787	0788	0789	0790	0791	0792
Zone 89	0793	0794	0795	0796	0797	0798	0799	0800	0801
Zone 90	0802	0803	0804	0805	0806	0807	0808	0809	0810
Zone 91	0811	0812	0813	0814	0815	0816	0817	0818	0819
Zone 92	0820	0821	0822	0823	0824	0825	0826	0827	0828
Zone 93	0829	0830	0831	0832	0833	0834	0835	0836	0837
Zone 94	0838	0839	0840	0841	0842	0843	0844	0845	0846
Zone 95	0847	0848	0849	0850	0851	0852	0853	0854	0855
Zone 96	0856	0857	0858	0859	0860	0861	0862	0863	0864
Zone 97	0865	0866	0867	0868	0869	0870	0871	0872	0873
Zone 98	0874	0875	0876	0877	0878	0879	0880	0881	0882
Zone 99	0883	0884	0885	0886	0887	0888	0889	0890	0891
Zone 100	0892	0893	0894	0895	0896	0897	0898	0899	0900

MSC NM12

Objekt	Objekt	Objekt	Objekt	Objekt	Objekt	Objekt	Objekt	Objekt	Objekt
Objekt 1	0001	0002	0003	0004	0005	0006	0007	0008	0009
Objekt 2	0010	0011	0012	0013	0014	0015	0016	0017	0018
Objekt 3	0019	0020	0021	0022	0023	0024	0025	0026	0027
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Objekt 8	0064	0065	0066	0067	0068	0069	0070	0071	0072
Objekt 9	0073	0074	0075	0076	0077	0078	0079	0080	0081
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Objekt 11	0091	0092	0093	0094	0095	0096	0097	0098	0099
Objekt 12	0100	0101	0102	0103	0104	0105	0106	0107	0108
Objekt 13	0109	0110	0111	0112	0113	0114	0115	0116	0117
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Objekt 16	0136	0137	0138	0139	0140	0141	0142	0143	0144
Objekt 17	0145	0146	0147	0148	0149	0150	0151	0152	0153
Objekt 18	0154	0155	0156	0157	0158	0159	0160	0161	0162
Objekt 19	0163	0164	0165	0166	0167	0168	0169	0170	0171
Objekt 20	0172	0173	0174	0175	0176	0177	0178	0179	0180
Objekt 21	0181	0182	0183	0184	0185	0186	0187	0188	0189
Objekt 22	0190	0191	0192	0193	0194	0195	0196	0197	0198
Objekt 23	0199	0200	0201	0202	0203	0204	0205	0206	0207
Objekt 24	0208	0209	0210	0211	0212	0213	0214	0215	0216
Objekt 25	0217	0218	0219	0220	0221	0222	0223	0224	0225
Objekt 26	0226	0227	0228	0229	0230	0231</			





# Application



**Thanks for your  
attentiveness**

