TETRA ARCHITECTURE AND INTERFACES

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Agenda

1. TETRA Architecture and Standard Interfaces
2. Description of Individual Interface
   - Network Aspects and Scenarios
   - Services
   - Protocols
3. TETRA Standard Gateways
   - Features
4. Network Management System
5. Control Room Gateway
6. Conclusions
Typical TETRA Network

- **1a**: Remote Line Station (Despatcher)
- **1b**: BS
- **2**: Another TETRA Network
- **3**: BS
- **4**: PSTN, ISDN PDN
- **5**: NMS
- **6**: Remote Line Station (Despatcher)
Air Interface (AI) Variants
## TM V+D AI Data Rate Capacities (kbit/s)

<table>
<thead>
<tr>
<th>Number of Timeslots</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<td>No Protection</td>
<td>7.2</td>
<td>14.4</td>
<td>21.6</td>
<td>28.8</td>
</tr>
<tr>
<td>Low Protection</td>
<td>4.8</td>
<td>9.6</td>
<td>14.4</td>
<td>19.2</td>
</tr>
<tr>
<td>High Protection</td>
<td>2.4</td>
<td>4.8</td>
<td>7.2</td>
<td>9.6</td>
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</table>
TM V+D Ai Services

• Speech
• Data
  – Circuit mode
  – Packet mode
  – Short data service
• Supplementary Services
• Call Control
• Mobility Management
• Security Services
TM V+D AI Protocol Stack

CONTROL PLANE

- Mobility Management
- Packet Data

USER PLANE

- Speech
- Circuit Mode Data

Layer 3

Mobile/Base Link Control Entity

Layer 2

Logical Link Control

Layer 1

Medium Access Control

Physical Layer

• Call Control
• Short Data
• Supplementary Services

USER PLANE
Direct Mode AI Scenarios

1. INDIVIDUAL CALL

2. GROUP CALL

3. DUAL WATCH

4. MANAGED DIRECT MODE
Example: ISI Group Call Configuration

- REQUESTING AND PARTICIPATING NETWORK
- PARTICIPATING NETWORK
- CONTROLLING AND PARTICIPATING NETWORK
DM AI Protocol Stack

CONTROL PLANE
- Call Control
- Intrinsic Services
- Short Data
- Direct Mode Call Control

USER PLANE
- Circuit Mode Data
- Speech

Layer 1: Physical Layer
Layer 2: Data Link Layer
Layer 3: User Plane
5. DIRECT MODE REPEATER

6. DIRECT MODE GATEWAY

7. DIRECT MODE REPEATER/ GATEWAY

8. MANAGED REPEATER/ GATEWAY
Services Supported by ISI

- To other Regional SCN
- To other TETRA Networks
- Regional
- To other Local SCN

SCN: Switching Control Node
NMS: Network Management System
BS: Base Station
Peripheral Equipment Interface (PEI)
PEI Protocol Layers

APPLICATIONS

TCP  UDP

IP  TNP1

PPP

V. 24/V. 28

TO MOBILE STATION
**ISI : Protocol Stack**

- **TETRA INFRASTRUCTURE 1**
  - TETRA ANF
  - Specific TETRA Operation
  - ITU-T Rec. X.229
  - ISO/IEC 11582
  - ISO/IEC 11572
  - ETS 300 402-1 and 2
  - Layer 1

- **TETRA INFRASTRUCTURE 2**
  - TETRA ANF
  - Specific TETRA Operation
  - ITU-T Rec. X.229
  - ISO/IEC 11582
  - ISO/IEC 11572
  - ETS 300 402-1 and 2
  - Layer 1

**PRIVATE SIGNALLING SYSTEM 1 (PSS1) USED IN ISI STANDARD**
TETRA as an IP Network

- WAP Terminal
- Database
- LAN Server
- Bluetooth
- Dispatcher
- Network Management Center
- WAP GW
- Control Room Server
- GPS
- Internet
- Corporate Intranet
- Content Provider

TETRA Infrastructure

Voice/IP

IP Switching/Routing Network

IP
Standard API and Applications

Applications
- Internet Access
- AVL
- Telemetry

Standard API
- WAP

Bearer Service
- SDS
- IP Packet Data
- Circuit Mode Data

TETRA ADAPTATION LAYER

TETRA Network
Network Management (1) (Internal)
Network Management (2) (external)

- Performance Management
- Fault or Maintenance Management
- Subscriber Management
- Accounting Management
- Security Management

TETRA 1

NMC

ISI

TETRA 2

NMC

ISI

TETRA 3

NMC

ISI

CNM
PSTN Gateway
ISDN Gateway

2B+D
30B+2D

ISDN GW

ISDN
Control Room Gateway (1)

- Control Room Gateway
- Internet
- Corporate Intranet
- Internet Server
- AVL Controller
- Databases
- ICCS
- Dispatchers
- Legacy Radios
- TETRA
- GPS
- PSTN / ISDN
- IT System
- Call Logging
- CCTV
- Paging
- Fax / Email
- Voice Recording
- Others
Control Room Gateway (2)

• Not standardized because of different applications requirements from different user sectors

• Current trend is to include Flexible Application Programming Interfaces (APIs) which:
  • Facilitate Programming at a higher abstraction level
  • Allow integration of radio functionality in different systems
  • Guarantee flexibility of control center configuration
  • Allow GUI’s customization

• Management of following functionalities through API using API libraries or through messages :
  • Audio parameters
  • Individual and Group Users
  • Supplementary services
  • Alarms
Conclusions

TETRA Architectures and Interfaces allow:

- Spectrally-efficient feature rich communication
- Choice of trunked or direct modes
- Interoperability between different TETRA networks
- Multimedia services, Internet access and mobile office capability
- Extensive data applications capability
- Inter-working with public networks
- High level of security