Operational Telecommunications by

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About RideOnTrack (1)

- Specialised in delivering state-of-the-art communication solutions for mission critical networks.
- Years of experience in deploying Operational Telecom systems in railway networks.
- Design, production, installation and maintenance of Operational Telecom products (OpTel).
- Able to understand specific customer needs and translate them in latest state-of-technology solutions.
- Tailored to address niche market demands. Customer specific development as key asset.
- Understanding legacy and how to co-exist/migrate to SIP/IP.

Release of the (EIRENE) dispatching product. Received the IWT innovation award. Roll-out of gateways at Infrabel.

Won the Infrabel RFQ for SIP to analogue track phones. Start roll-out dispatching at Infrabel. Approved federal innovation project.

Release of the gateway product line. First products installed at Infrabel.

Won the Infrabel RFQ for the renewal of the OpTel (EIRENE Dispatching).

**USERs:**
- Signalling Posts for geographical area,
- Traffic Control for the O&M of the complete rail network,
- Power Dispatchers controlling the catenary power,
- Workers/train drivers using track site phones at crossings and signals,

**REQUIREMENTS:**
- Station masters: responsible for the operation of the station,
- General public: emergency phones or public address systems, opening gates,
- General public: restricted access to/from PSTN and PBX,
- Enforced operational procedures
- Co-exist & interface with legacy,
- Rail specific features Priority, emergency, group call, etc.
- Geo-redundant none blocking,
- Centralised/distributed recording,
- Allow smooth migration.
(Fixed) Operational Telecommunications (2)
GSM-R became the ‘de facto’ international standard for mobile communication within the railway industry.

GSM-R is a 2G technology specially enhanced with railway specific requirements (e.g. PTT, VGC, MLPP, etc.),

GSM-R is a digital communication system allowing enhanced feature implementation, and as such, improve the operational performance of rail operators,

GSM-R is an operational telecommunication system requiring (centralised) operation/dispatching control as specified in EIRENE/MORANE,

**Dica_Rail** is an EIRENE/MORANE compliant Fixed Dispatcher Terminal (FDT) solution
GSM-R (EIRENE) dispatching (2)

TLS: Train Location Server
MSC: Mobile Switching Centre
HLR: Home Location Register
IN: Intelligent Network
SMSC: Short Message Switching Centre
LAN: Local Area Network
MAN: Metropolitan Area Network
PRI: Primary Rate Interface
EB: Euro Balise
GSM-R: Mobile network with Rail functionality
PSTN: Public Switched Telephony Network
BTS: Base Transceiver Station
MUX: E1 CAS to analogue multiplexer
DiCa Rail-dispatching features (1)

Outgoing Calls:
- Decoded Call Type and Function Code,
- Push-To-Talk (Mute/Unmute/Force Release for group calls),
- EIRENE numbering plan (Code-type / Function Code),
- Emergency Call button,
- Easy train call via active train buttons,
- Automatic selection of call priority (MLPP),
- All kinds of quick/enhanced dial possibilities.

Incoming Calls:
- Incoming call queue (50) with highest priority calls on top (MLPP),
- Display of caller’s MSISDN number and FN,
- Decoded FN (call type and function code).

Supplementary Services:
- Hold multiple held calls possible in the call queue
- Consultation & Transfer,
- Monitoring channel for overhearing several radio connections.

Advanced Call Queue Handling:
- Full call queue display per dispatcher,
- Multiple calls on HOLD,
- Allowing pickup of any call in Queue (for disaster recall selection).
## DiCa Rail dispatching features (2)

### Roles & Profiles:
- Logon with automatic profile selection and phone book download,
- EIRENE phone books (with decoded function type),
- Automatic rerouting of unnamed roles.

### Flexible Role Assignment:
- Allowing controllers to share the same role with forking,
- Allowing controllers to have multiple roles (e.g. during night service),

### Phone Books:
- User can configure personal phone books,
- Phone books and/or phone numbers can be assigned to specific user groups,
- Personal and EIRENE role based phone book per dispatcher,
- All books centrally stored, downloaded at dispatcher login,
- History list of all calls of the last 24hs,
- For each phone book entry additional information can be stored/requested.

### Open Train Location Interface:
- Allowing proprietary railway systems connectivity,
- Easy alignment with ETCS developments.
GUI design principals:

- Easy to use intuitive touchscreen interface (near to zero training needed)
- Visually calming and uncomplicated views, with careful use of colors and contrast which result in excellent visibility both in light or dark environment,
- Maximal use of icons for all operations as well as the display of status,
- Uniformity of shape and size of the keys, icons, characters, texts, etc.,
- A 12”-touchscreen sufficient to allow easy operation and as a result minimalizing the required table space.

Specifications:

- Intel J1900 2Ghz (2.4 Ghz burst), SSD 32 to 256Gb, RAM 2 to 8Gb, Windows IoT,
- Connections: 2xUSB2, 1xUSB3, 2x1Gbps Eth, 2xaudio, 1xHDMI, RJ45 option,
- Capacitive 12” high brightness TFT LCD, 1280x800 WXGA MVA. capacitive touch,
- No moving parts, natural cooling, silent, Industrial grade components, IP32,
- Left/right mountable handset/loudspeaker. External USB goose neck,
- Low profile horizontal design. Inclination mechanism for 18,5°, 21,5°, 24,5° view angle,
- 4w loudspeaker.
DiCa Rail dispatching look & feel (4)
DiCa Voice Recorder (+storage +gateway +play-back)

- **IP (SIP)**
- **PRI CAS**
- **Or ISDN**
- **unframed ISDN, CAS**
- **RS232**
- **LAN**
- **V24**
- **CTI interface (start, stop, clip, etc)**
- **optional gateway RS232/LAN**

**RideOnTrack solutions**

**DiCa voice recorder**
- Storage & gateway
- Play-back

**Server 1+n**

**1+n * Play-back stations**

**Mobile Operational GSM-R**

**Legacy TDM Unframed RS232**

**Fixed Operational TDM Telephony**

**Fixed Operational Ip Telephony**

**Ip-PBX**

**TDM-PBX**

**Ip (SIP)**

**IP (SIP)**

**TDM PRI**

**TDM PRI**

**SIP-R or PRI ISDN**

**unframed ISDN, CAS**
DiCa Voice Recorder features

Recording highlights:
- 1 platform that can record all,
- Support of multiple interfaces, legacy (Rail) as well as IP/SIP,
- CTI Start-stop triggers, eg. Voice level, CTI data, etc.,
- Call info can be received via CTI interface or via ISDN protocol,
- EIRENE specific info elements (MLPP, Functional number, ...),
- distributed or centralised config
- Remote monitoring and diagnostics,
- Can work on R4 and R99 at the same time (during migration),
- 100% RideOnTrack IPR, flexible customer specific adaptations.

Play-back highlights:
- Via standard web browser,
- Windows based GUI,
- User friendly interface (N2ZT),
- 1 or more web-servers possible,
- web-server integrated in VR,
- Centralised user management (eg. Login/password, etc.),
- Playback users access limited to certain areas, channels, etc.,
- distributed and centralized recording (storage)
- Intelligent search selection,
- Multiple language support,
- History on who listened/who copied voice records,
- GSM-R call info display.

Technical highlights:
- low cost servers (HP, Dell, etc..) with PCIe slots (e.g. 8 core 5K€),
- E1 interface cards in different configurations (2, 4, 8, 16 E1),
- Up to 64 E1 interfaces per server – recording of up to 1920 simultaneous calls,
- E1 card supports CAS, ISDN, etc.,
- storage in compressed MP3,
- Only 1000 bytes per sec per user disc space required,
- Runs under Windows,
- Hot and cold standby possible,
- Able to send SNMP-trap,
- Customer can buy SW-only and install on existing HW.
DiCa Gateways

1. SIP <-> CAS
2. SIP <-> ISDN
3. SIP <-> QSIG
4. SIP <-> SIP-R
5. SIP <-> ISDN GSM-R specific
6. SIP <-> SIP vendor specific
7. CAS <-> ISDN
8. CAS <-> QSIG
9. CAS <-> SIP vendor specific
10. CAS <-> SIP-R
11. ISDN <-> ISDN GSM-R specific
12. ISDN <-> QSIG
13. ISDN <-> SIP-R
14. ISDN <-> SIP vendor specific
15. QSIG <-> ISDN vendor specific
16. QSIG <-> SIP vendor specific
17. QSIG <-> SIP-R

- Sangoma PCIe (1xE1, 4xE1, 8xE1, 16xE1),
- Up to 64 E1’s in 1 server,
- Geo-Redundant configuration,
- Mix of protocols on an E1 granularity,
- IP over SDH gateway for migration scenarios,
- Analogue phone to SIP-gateway, 24 and 50 circuits, 12km loop.
Software bus highlights:

- event driven SW-concept making use of a SW bus architecture,
- designed to run on embedded systems in a real time environment,
- can run on existing ICT-infrastructure,
- C++, visual studio, GUI, Dotnet
- 5 general purpose and 25 functional modules,
- interworking module can interconnect software buses running on different systems,
- SWA Interface allows the connection of a Software analyzer tool.

Software testing & maintenance:

- Automated testing (functional, DiCa_load, system_load),
- Test/training simulation of almost all rail specific network elements,
- Own Traffic/load generator,
- Functional testing via (GUI) usage recordig,
- Remote monitoring/control – remote SW-download,
- Subversion TortoiseSVN Software version control system,
- Software fault reporting tool.
SIP Proxy Service versus Back-to-Back user agent (1)

1. no call active : DPC1, 2,3 and 4 register on SCFM1, 2 and 3

2. Normal active calls : first call always on SCFM1

- The RoT dispatcher clients are intelligent (SIP) devices,
- Task of SCFM is reduced to absolute minimum – almost flat architecture,
- Zero call-drop when a SCFM fails,
- calls in queue or on hold do not stream voice. Voice Active Detection,
- Average network load per dispatcher : 85Kbps US and 40Kbps DS,
- Network load for 2000 clients : 170Mbps US and 80Mbps DS,
- A B2BUA-design would generate 3 to 4 times more network traffic,
- (centralized) voice recording can be very bandwidth demanding,
- The RoT-solution uses distributed processor power.
Load sharing and redundancy

3. Load balance DP1: second call always on next available SCFM

4. Load balance DP3: second call always on next available SCFM

5. Failure of SCFM1 during load balanced calls

6. SCFM2 takes over the SCFM1 functionalities
RideOnTrack is a manufacturer of critical telecommunication products that can fulfill most (fixed) operational requirements.

The RideOnTrack’s software platform and the RideOnTrack software design/debug capabilities allow for cost effective customer specific engineering.

We have the critical communication domain know-how required to translate the customer demand into products and services.

Our DiCa Rail products enable Rail Infrastructure providers with a smooth migration from legacy (PDH/SDH) networks to SIP/IP.