

Telecoms



A White Paper by
Peter Janík, General Manager
Milan Piskla,
Deputy Technical Director

CN Resources
International (SK) s.r.o.
A CN Group Company

White Paper: CN Group in Telecoms

Introduction

The CN Group was founded as CN Resources International (CZ) a.s. in Prague in 1994 and in 1998 its daughter CN Resources International (SK), s.r.o. was established in Bratislava. CN has over thirteen years experience providing near-shore software development outsourcing services and supporting consultancy to customers, particularly in the telecoms, financial, aerospace and automotive sectors.

There are two shareholders, each owning 50% of the Group:

Corena, the International software, services and consulting group, is the leading documentation supplier to major clients mainly in the aerospace, defence, airlines and manufacturing industries specialising in documentation services and systems particularly in safety critical and mission critical environments.

Anritsu A/S, a division of the Anritsu Corporation, is a leading worldwide provider of test and measurement instruments and network monitoring solutions for optical, wireless, wireline, broadband and enterprise networks to blue chip companies in over 140 countries.

Outsourcing

The CN Group has more than thirteen years experience in 'near-shore' outsourcing services developing software for clients in Scandinavia, Germany, the UK, other European countries and its home markets. CN complements this activity by IT Management Consulting to help customers effectively organise the outsourcing partnership, manage projects and assure quality.

The Group operates from the Czech and Slovak Republics, delivering the benefits of geographical proximity, competitively priced, highly qualified resources, and a shared culture and business environment.

This White Paper examines CN Group's experience in, and work for, customers in the Telecoms sector.

CN Group Telecom Projects

Signaling protocols (Anritsu A/S)

CN Group's protocol team has developed and maintains components for monitoring the following telecom interfaces/protocols for Anritsu (www.anritsu.com) MasterClaw surveillance system:

VoIP

- SIP (including variants SIP-I, SIP-T, IMS)
- MGCP
- H.248 / MEGACO (text and binary encodings, including vendor variants, e.g. Ericsson)
- H.323
- RTP / RTCP
- BICC
- Unistim (Nortel proprietary)

White Paper: CN Group in Telecoms

UMTS

- Iub, Iur (including vendor variants, e.g. Nokia, Ericsson, Siemens)
- Iu CS including 3G-324M (H.245, H.223)
- Iu PS

GPRS

- Gb, Gn, Gr
- MAP – C, D, E
- SMRSE (Nokia proprietary)

IP

- Gn / Gp
- DNS
- RTP / RTCP
- OSPF
- Sonus (proprietary)

SS7 & Sigtran

- MTP
- SCCP
- ISUP
- M3UA, M2PA, SUA

The MasterClaw protocol components implement various services: decoding, filtering, statistics, call-tracing and call-in-progress monitoring. The CN Group team has a great knowledge of different kind of protocol encoding rules ranging from simple text encoding to complex ASN.1/PER, utilizing both the Anritsu/CN specific tools and 3rd party tools, e.g. OSSNokalva. As a part of the embedded real-time probes, the protocol components are performance critical and thus the team always designs/develops the new components with the performance view in mind.

MasterClaw Applications (Anritsu A/S)

CN Group has developed, and maintains, a major part of the application suite used by Anritsu's MasterClaw monitoring system.

The most important applications maintained by our team are:

- *Protocol Analyzer* - multi-protocol analyzer with decoding and filtering features. The decoding is available in various zoom levels. The analyzer allows hiding sensitive data (e.g. SMS content, telephone numbers, etc.) for users not granted for viewing it. The user interface supports language localization proved by a Chinese customer.
- *Alarm Monitor* – for receiving alarm events from the whole monitoring system and to present them to the user featuring convenient filtering capabilities. It can be connected to third party systems by using SNMP.
- *Traffic Observer* - provides a real-time overview of the network and service performance. The signalling statistics are presented in highly configurable graphical charts. Drill down capabilities allows comfortable identification of problem cause.
- *UMTS Signalling Input Mediator* – core part of the MasterClaw UMTS probe, prepares signaling data by complex deciphering and reassembling to further processing.
- *Configuration Editor* – allows users to setup complex network topology (thousands of signalling links) for monitoring.

White Paper: CN Group in Telecoms

- *Link Validation* – verifies that the signalling captured by probes match the configuration
- *Configuration Database*– using Oracle Database, this provides the configuration interface for all MasterClaw applications.
- *Data Warehouse* – complex application suite calculating key performance and quality indicators in various telecom domains including GSM, GPRS, UMTS and VoIP
- *eoPath Commit* - Real-time customer experience and SLA monitoring solution controlling the service quality in telecom networks. It gives an instant overview of service quality in relation to the service objectives defined in each customer's SLA.
- *MasterClaw Backup* – a backup of the MasterClaw system.
- *Probes* – software for various kinds of probes (different inputs – ATM, Ethernet, T1, HSL, etc) for capturing, filtering and pre-processing of PDUs and provisioning to MasterClaw applications; hardware interfacing (Linux kernel drivers); multithreaded real-time programming. CN team has also developed deciphering solutions necessary for monitoring GPRS Gb and UTRAN interfaces.
- *Correlation support for Call Trace* – analysis and implementation of correlation scripts to trace complex call scenarios.

Business Intelligence (Anritsu A/S)

CN Group develops and maintains Business Intelligence applications of the MasterClaw system that are used by sales, marketing, as well as by technical teams of telecom operators:

- *KPI applications* – performance measurements, e.g. IP service, Message Statistics, etc.
- *SQM applications* – service quality management, e.g. VIP Monitoring, Enterprise Monitoring, Handset Monitoring, etc

Measurement Instruments (Anritsu A/S)

CN Group participated in the design and development of measurement instruments for Anritsu A/S:

- *NetClaw* – advanced network and performance portable analyzer featuring Protocol Analysis, Call Trace and statistics applications embedded in a portable instrument. The instrument supports GSM, GPRS, UMTS, VoIP and SS7 protocols.
- *CMA 3000/5000* – field tester for fixed and mobile networks
- *VoIP Analyzer* – real-time application for VoIP measurements of QoS parameters for codecs EVRC-A and G.729. Another feature is an audio replay for a selected VoIP call.
- *3G-324M Analyzer*– application for MPEG-4 video extraction from luCS user plane (H.245, H.223) The application extracts video chunks from phone calls and generates mp4 files that can be replayed by standard media players.

White Paper: CN Group in Telecoms Networking Equipments (Tail-f)

CN Group participates in Tail-f projects (www.tail-f.com) developing embedded management software and tools for networking equipment such as routers, switches, gateways, controllers, etc.

GoHello™ (GoHello)

CN Group as technology partner of Danish company GoHello is significant part of GoHello R&D team developing an innovative ALLmobile virtual phone systems distributed as software as service to mobile network operators (MNOs) worldwide. The application allows that each employee has a single phone, whether it's their mobile or a desktop GSM phone, that is connected to an easy to use web-based switchboard providing all the features of a high end telephone system without any of the hassle. The application was awarded by eight prestigious technical and business awards (so far).

CN Group team redesigned architecture, solved technology upgrade and also implemented process improvements to entire GoHello product development.

CN Group also provides GoHello with on-site installations of the systems at each MNO and further technical support and maintenance of the GoHello services as business critical application in 24/7 regime.

GOOMRadio.com (Go On Media)

GOOMRadio is a new start-up web application consisting of high definition radio streams offering, in addition to professional radio stations, tools that allow listeners to create their own personal radio station. CN Group is testing the GUI part of the application as well as a portion of the backend.

UbiqVistas (ParsGroup)

CN Group was part of a consortium developing the UbiqVistas project – a mobile phone multimedia platform for tourist information purposes. Tourists can use their 3G mobile phones to get live camera views, along with a voice narration, of tourist sites such as historic squares, historical centres, parks, etc. CN Group developed the video and voice streaming part integrated with the ParsGroup Platform (www.parsgroup.at).

Consulting (Sitronics)

CN performed consulting services for Sitronics Telecom Solutions, Czech Republic a.s. (www.sitronics.com) in the QA area. It was a project of implementation of Capability Maturity Model Integration (CMMI, ver. 1.2) methodology and preparation for final assessment.

The activities consisted of performing GAP analysis (complete mapping of current state of existing processes, rules and adherence to them), special training of Sitronics TS CZ employees in methodology and terminology of CMMI, collaboration in creating and revising processes and standards for key process areas, implementation of processes and standards into the quality system of Sitronics TS CZ, support in establishing new processes and standard into the pilot projects, performing pre-audit of pilot projects and consequent support in defining corrective actions and performing final accredited CMMI assessment

Installation and customer support (Anritsu A/S, GoHello)

CN Group installation and support engineers operate worldwide for Anritsu and GoHello customers in several ways:

- *Installation engineers* working on site at different customers, preparing and making systems installations.
- *Support engineers (on-site)* working hands-on at different customers' sites and providing systems support, upgrades, housekeeping, etc
- *Support engineers (off-site)* working remotely from CN premises and providing systems support, upgrades, housekeeping, etc
- *24/7 support* for some customers having an SLA with Anritsu A/S

White Paper: CN Group in Telecoms

The customers served by CN Group are e.g. T-Mobile Hungary, Netherland, T-Com, T-Systems Germany, NTT DoCoMo Japan, Vimpelcom Russia, AT&T Wireless (US), KyivStar (UA), Telefonica O2 (CZ), Etisalat (SAE), Globe (Philippines), O2 (UK), etc

CN Group's Technical Profile

Software engineering

CN Group has a proven track record of professionally managed software projects. CN follows an iterative variation of the waterfall model with special focus on prototyping and early first deliveries for visibility purposes. Where appropriate Agile techniques are used, for example the SCRUM framework.

CN Group is well practised in adjusting its standard software development process to conform to the customer's own standard, and can do this thanks to its extensive experience acting as a software development / project management / testing / QA services sub-supplier to other software companies.

Software testing

Code bases that CN Group teams maintain include millions lines of code in C++ and Java. The teams maximise the code test coverage by implementing automated tests whenever feasible. Standard test tools are used such as CppUnit, JUnit, QFTest, supplemented by CN Group's own tools and extensions.

CN independent test group tests each deliverable according test specifications. All problems are tracked by means of the Mantis bug-tracking system. The quality metrics for each project are carefully analyzed and evaluated.

Software technology skills (used in telecom projects)

Programming languages

- C, C++ including STL, Boost and ACE libraries
- Java/J2SE, J2ME, J2EE, various GUI libraries
- PHP, Python
- Unix shell scripts

Databases

- Oracle
- MySQL
- PostgreSQL

Operating systems

- Linux, embedded Linux
- Windows

Tools

- ASN.1 tools from OSS Nokalva
- Unit testing frameworks: JUnit, CppUnit
- Testing tools: QFTest, Testlink
- Build tools: ANT, Maven
- Static code analyzers: Lint, Checkstyle, PMD
- Profilers: JProfiler, OProfile
- Continuous integration: CruiseControl, TeamCity
- Versioning systems: CVS, Subversion, PVCS
- Bug tracking systems: Mantis, Bugzilla, Track

Other skills

- UML
- XML Schema, XSLT

White Paper: CN Group in Telecoms

- JDBC
- GWT
- Web services
- Web servers, Apache, Tomcat, Jetty
- Servlets
- CORBA
- SNMP
- TIBCO
- Billing systems used by telecom operators

Besides these, CN Group can also deploy many more skills used in non-telecom projects for example .net, web technologies, etc.

Quality

The CMMI (Capability Maturity Model Integrated) methodology is an internationally recognised quality assurance standard developed at the Software Engineering Institute (SEI) of Carnegie-Mellon University in the United States. CMMI is a process improvement approach particularly suited to software development organizations, providing them with the essential elements of effective processes. CN Group met the CMM Level 2 standard in 2002, and was added to the list of organisations compliant with the CMMI Level 3 standard on May 1st, 2008.

CN Group Telecom customers

- *Anritsu A/S [Denmark, Italy, Japan]*
- *GoHello [Denmark]*
- *Alcatel-Lucent [Slovakia]*
- *Tail-f [Sweden]*
- *ParsGroup [Austria]*
- *Sitronics [Czech Republic, Russia, Serbia]*
- *GOOM Radio [France]*

© 2009 and published by

CN Resources International (CZ) a.s.
Ve Smečkách 20
110 00 Praha 1
Czech Republic
+420 234375111
www.cngroup.cz

CN Resources International (SK), s.r.o.
Železniarska 13
811 04 Bratislava
Slovak Republic
+421 2 57780210
www.cngroup.sk