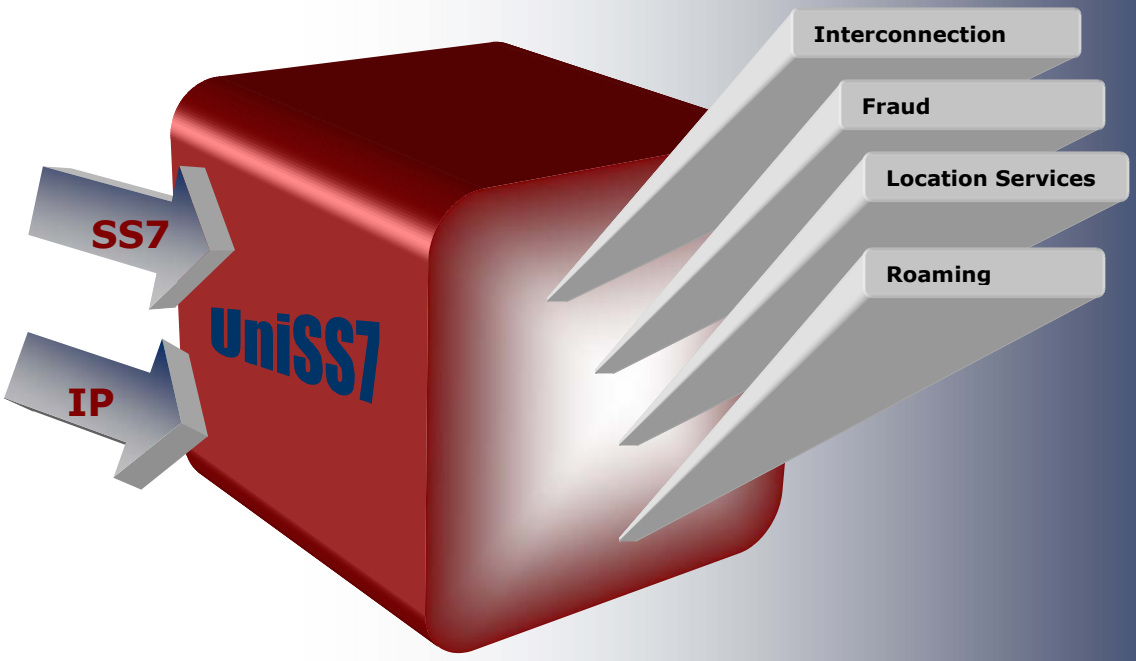
# *Network Visibility*

## *Driving Business*

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TELOGIC

# UniSS7 Network Monitoring & Management Solution

The **UniSS7** is a non-intrusive signaling monitoring system that allows extraction of valuable real-time information from wireline or wireless network. It captures and analyzes all SS7 messages flowing in the SS7 network to give Telecommunication Operators the data needed to dramatically improve the efficiency of the network, boost profitability, increase customer satisfaction and enable an array of Value Added Services.

Based on open architecture, standards, client/server and web-based technologies, the UniSS7 the ideal solutions for the concurrent deployment of multiple enhanced voice and messaging applications via the mobile network.

Besides providing high performance solutions and ease of maintenance, the system is also highly scalable. Future expansion can be done easily by adding modules and features when required, thus protecting the initial investment. UniSS7 provide complete network visibility and present real time information available from the network, via web based management module.

UniSS7 provides tools for both network and business oriented applications such as:

- Traffic Engineering
- Network Planning
- Interconnections Arbitration for Voice or SMS
- Realtime SS7 information to Fraud Management/Billing System
- Location Based Services
- Roaming Services (Welcome SMS for incoming roaming subscribers, optimal routing, etc)

## System Architecture

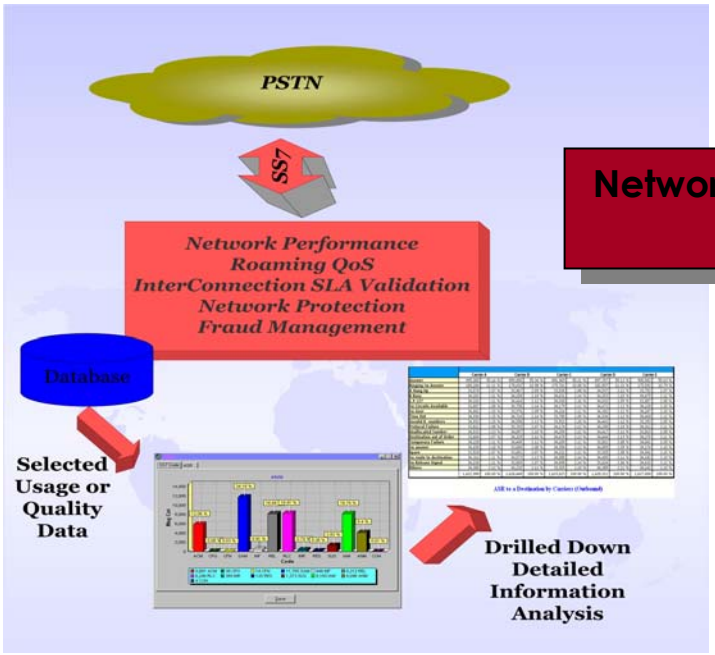
UniSS7 is designed and developed using a Client Server Architecture that has built-in flexibility and scalability.

It can be deployed on an open-system-based multi-slot CompactPCI® platform or a carrier-grade industrial computer system. The architecture supports the most demanding mission critical and carrier-grade applications.

UniSS7 provides a web-based management feature that allows the network planners, network operations personnel and even marketing representatives to access the real-time statistics and historical reporting applications. For network operations personnel, critical information such as:

- PCM alarms
- System events
- Hardware status
- Signaling links details

The network planners can also access the web-server and generate Traffic report, QoS Report from the Real-Time database system. This powerful feature allows the authorized user to access real-time information at their fingertip anytime, anywhere and even over the internet. In addition, you can offer this as a value added service to your key customer on selected reports.



# Network Visibility
## Driving Business

## Product Highlights

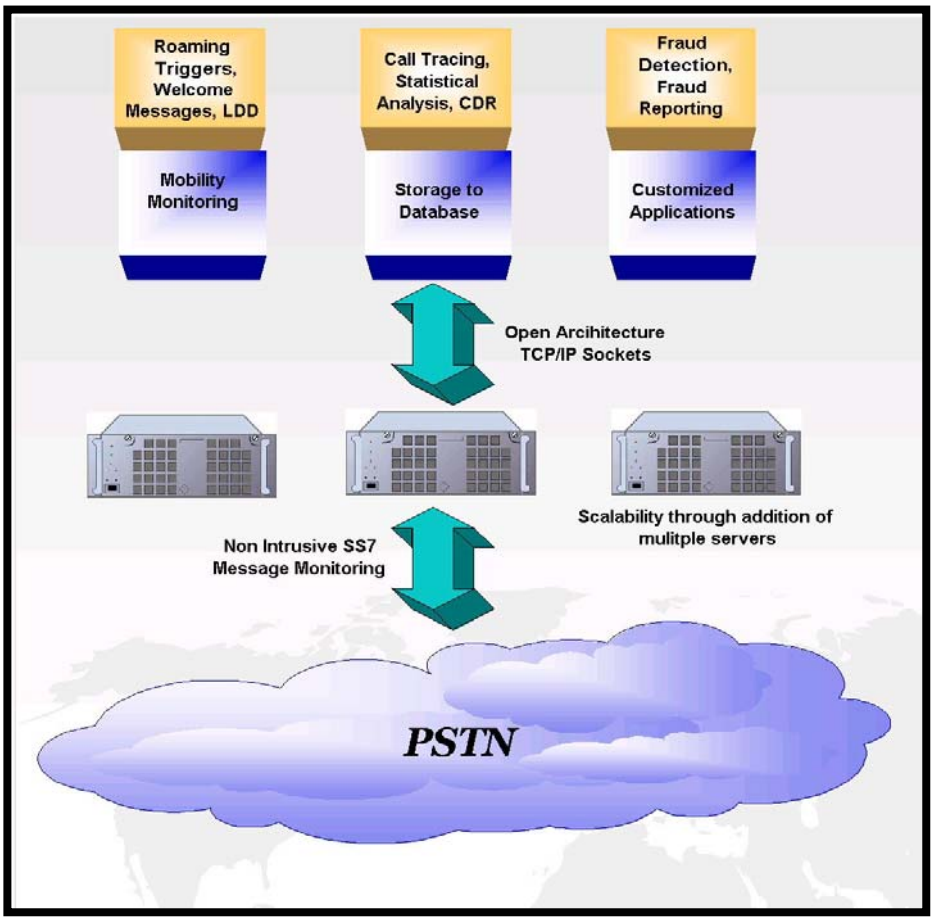
- Non-intrusive Real-Time SS7 Message Monitoring and Logging
- Highly Scalable Client Server Architecture
- Flexible Filtering of SS7 Messages
- Fault and Performance Management - Operational and Alarm Logging
- Protocol Analysis - Provides detail description of SS7 message and parameters for Traffic Engineering Application
- Multiple Protocol Support
- Real Time CDR Generation
- Voice and SMS arbitration report
- Complete Network visibility through real time information captured

## UniSS7 Applications

UniSS7 provides tools for both network and business oriented applications:

- **Traffic Engineering & Network Planning** - This application gives continuous real-time measurements on SS7 traffic across the network, providing immediate warning of abnormal activity that threatens network performance. This allows immediate action to be taken to avoid catastrophic failure. An immediate alert is produced when any of the operator set thresholds are breached.

- **Interconnections Arbitration** – As the UniSS7 taps on the signaling links to monitor all calls that goes through the monitored link; the UniSS7 can be used as a powerful tool for Interconnection Arbitration for Telecommunication Operators. UniSS7 can be used for arbitration for Voice Traffic or even SMS traffic by locating it at Gateway MSCs and other traffic entry and exit points from the Telco network. The UniSS7 can be further used as an "Auditing" tool of existing Billing or CDR generated from the network's switch.



- **Fraud Detection and Control via Real-Time CDR** - This application can substantially reduce Telco's fraud losses by detecting fraud as it takes place. UniSS7 supply this application with real-time call control information that allows it to builds call detail records as the calls take place. Once a call detail record is created, it is analyzed and matches against a table of user configurable threshold and scenarios. Fraud alerts are generated when matches are detected. These trigger the fraud management system to take action in real-time and shutdown any fraudulent acts

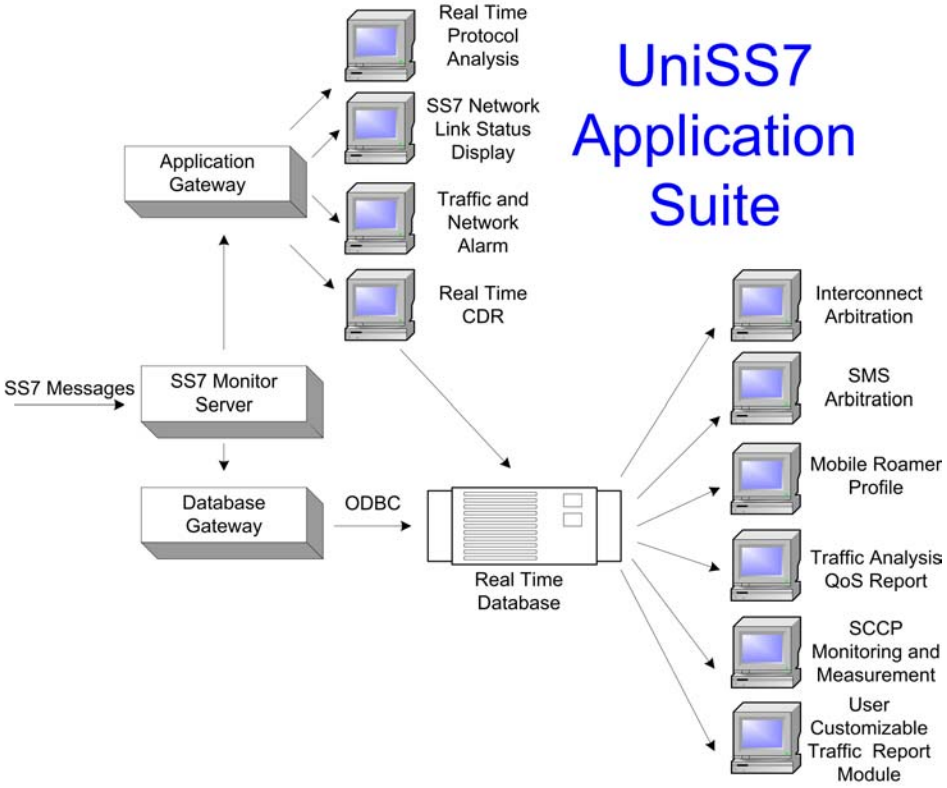
- **Location Based Services** –With this service, Mobile Operators can offer enterprises a chance to "push" their company's presence to mobile subscribers that is in the same "Area". Whenever a mobile subscriber moves between two different "Areas" of the mobile network, the Mobile Station (MS) would send a Location Update to the Network. When UniSS7 detects this. It will search in the Database for any advertisement to "push" to this customer. (E.g. Store wide sales at ABC outlet)

- **Welcome Message** - The Welcome Message is an attractive service, which service provider looking forward to capture the roamer to log on into their network. The Welcome message may be implemented for useful information such as weather forecasts currency exchange rates and local favorites to be sent periodically to the roamer during his/her stay in the visiting country. The WSMS system provide means for service provider to reach out to both the Inbound and Outbound Roamers, providing them with customized information, thereby improving service experience for the Mobile Roamer and increases their loyalty towards the service provider

- **Optimal Routing** - This application is an innovative mobile service that encourages roaming subscriber from any foreign country to stay in the Roamed Mobile Operator's network. The OR system offers a more cost effective way to make calls to an Inbound Roamer by bypassing the IDD paths via the roamer's home network. It provides extra incentives for inbound roamers to stay with operator's mobile network, increases revenue to operator arising from more calls to roamers, reduces costs and higher margins for calls to roamers and better quality calls for roamers. The Mobile Operator can then makes the network their preferred choice and generate more revenue from the inbound roamers with the Local Direct Dial or Optimal Routing Services.

# UniSS7 Applications Suite

UniSS7 provides a suite of application that enables network monitoring and value added services.



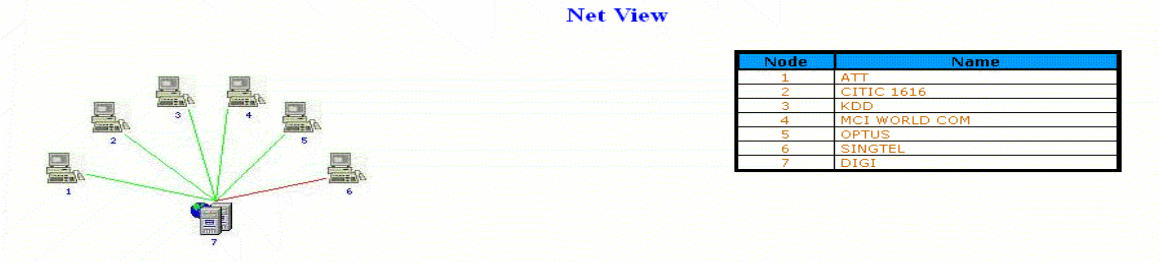

## A) Network Surveillance Suite

The UniSS7 system provides real-time, network-wide surveillance of a carrier's network. The UniSS7 Surveillance Suite enables early detection of network outage, logging of network performance statistics for analysis, enables real-time call trace, and troubleshooting.

UniSS7 is a highly scalable, comprehensive, end-to-end network management solution that extracts complex low–level signaling data into highly valuable information that increases the operator's visibility of its network interconnection for interconnect management.

It also allows network integrity assurance through its non-intrusive surveillance of the entire SS7 network, monitoring all the messages that are sent over the signaling links. The information collect by UniSS7 provides the operator to fully optimized its SS7 network and enhance its business efficiencies.

UniSS7 provides a global view capable of visualizing the network's performance. It is able to provide a topological representation of the monitored and monitoring network in terms of nodes and the connections between them regardless of the network topology.




| Node | Name |
|---|---|
| 1 | ATT |
| 2 | CITIC 1616 |
| 3 | KDD |
| 4 | MCI WORLD COM |
| 5 | OPTUS |
| 6 | SINGTEL |
| 7 | DIGI |

UniSS7 provides visualization of Signaling Link (Monitored Network) with the following information:

- Carrier Name
- OPC (Origin Point Code)
- DPC (Destination Point Code)
- Signaling Link Name
- TS (Time Slot)
- CIC (Circuit Identification Code)

UniSS7 provides visualization of Signaling Routes (Monitored Network) with the following information:

- Carrier Name
- Signaling Type (ISUP)
- OPC (Origin Point Code)
- DPC (Destination Point Code)
- CIC (Min/Max)
- CIC (Count)
- Traffic Type (Incoming, Outgoing, Both)
- Routing Type (1st Choice, 2nd Choice, 3rd Choice)

## B) Real-Time CDR Suite

UniSS7 can provide call detail records (CDRs) and transaction detail records (TDRs) in real time. Using UniSS7, carriers have access to reliable network information immediately, unlike other batch type solutions may take several minutes to several hours to process.

Telco Switch generates CDR ranging from as fast as 3 hours to couple of days. This delay in producing the CDR may have huge impact when fraud activity is high. In addition, billing information may not always be available from switches during peak loads as switch resources are diverted to the more important task of call completion.

UniSS7 can substantially reduce Telco's fraud losses by detecting fraud as it takes place. UniSS7 supply this application with real-time call control information that allows it to builds call detail records as the calls take place. Once a call detail record is created, it is analyzed and matches against a table of user configurable threshold and scenarios. Fraud alerts are generated when matches are detected. These trigger the fraud management system to take action in real-time and shutdown any fraudulent acts.

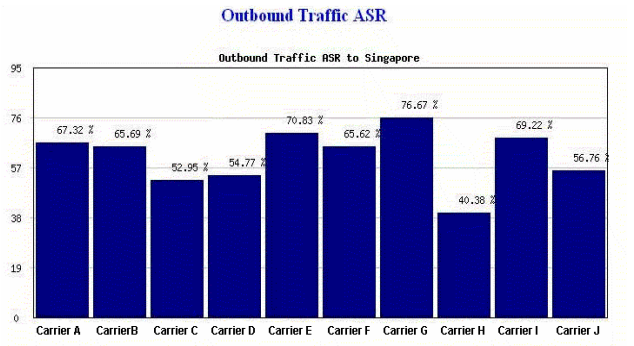
UniSS7 can customize the CDR to support any type of integration with the carrier's existing billing system.

## C) Interconnect Arbitration Report Suite

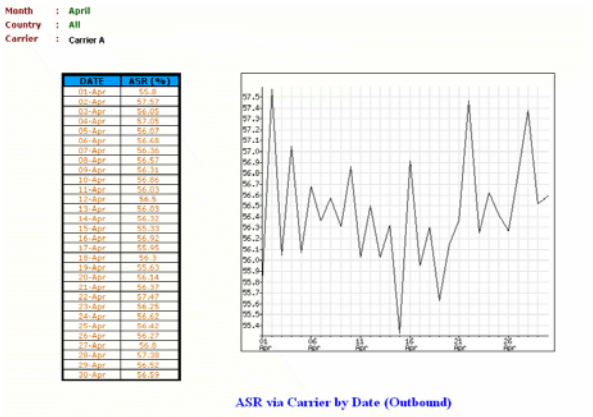
UniSS7 allows you to protect your revenues by verifying invoices from other interconnect carriers for your usage of their voice trunks and signaling resources. In the event of billing disputes, UniSS7 can help resolve the disputes by providing an independent supporting documentation of the use of your resources by interconnecting carriers, to accompany the invoices you send them.

UniSS7 also collects statistical information on the service quality delivered by interconnecting carriers to ensure that the interconnecting carries have fulfilled their Service Level Agreements.

By the same token, UniSS7 can help you manage your relationships with interconnecting carriers by monitoring your own performance. This can help ensure that your quality remains above pre-agreed levels to avoid disputes on non-conformance from other interconnect carriers.




UniSS7 can provide interconnect carriers ranking report by performing statistical calculation on the various information retrieve from the network such as Average Setup Time, Average Hold Time, ASR, Circuit Availability ratio, Congestion ratio, Call Failures, Network Failures.



UniSS7 can generate a Signaling Activity Report summarizing the MSU counts and signaling octets of both incoming and outgoing calls.

UniSS7 can also report summarized ISUP Usage or even itemized ISUP usage. It provides summarized views of call setup and call termination for any selected interconnect carriers, or aggregated link sets.

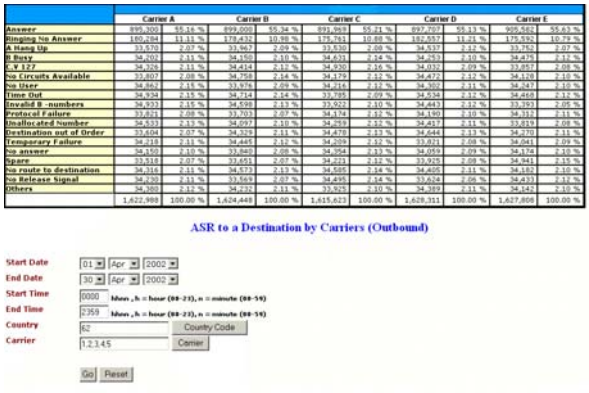
UniSS7 can generate report on the voice trunk Minutes of Use by carriers, Trunk groups of incoming and outgoing calls. This assists the carrier to verify their interconnection invoices for revenue assurance of reciprocal compensation.

The growth of SMS has been enormous and has hit tens of billions of messages in a quarterly basis. With this phenomenal growth, SMS delivery is starting to deteriorate with delays and non-delivery of messages. These performance issues can potentially affect SMS service revenues if customers may lose confidence in SMS as a method of guaranteed and fast message delivery. UniSS7 provide a solution for service providers to ensure the reliability of their SMS offerings. UniSS7 can also provide a mean to arbitrate the SMS that can being send and received between interconnect partners.

| Date | Gross SMS Messages | Errors Returned | Time-outs | Successful SMS | Unsuccessful SMS |
|---|---|---|---|---|---|
| Jan 2002 | 250000 | Absent Subscriber 1% | 500 | 247000 | 3000 |
| Feb 2002 | 300000 | Memory Capacity Exceeded 1% | 600 | 296400 | 3600 |

## D) UniSS7 Quality Analysis Report Suite

The purpose of service observation in the international service is to assess the quality of service obtained by the calling subscriber. Consequently, it is essential to have factual or objective recording of observations (i.e. successful and unsuccessful calls) UniSS7 can generate the Quality analysis reports format as per ITU E.422 Recommendations.




Uniss7 logs all SS7 data in standard database schemas such as Oracle or Microsoft SQL. The historical data can be stored up to several months and reports can be summarized by carrier or link set and are linked to detailed reports so you can focus on activity by a selected carrier or link set.

UniSS7 Report Generator module makes it possible for the user to define customized reports. The following possibilities exists:

- Tabular reports
- Graphical reports (trend curve, histogram, bar chart, pie chart)

UniSS7 provides an overview of the network performance for all major function of a network and able to pin-point any quality problem in the network in details such as:

- Call completion/Answer seizure rate (ASR) with failure cause codes.
- Call Setup Time (IAM…ACM)
- Call Duration (ANM…REL)
- Call Hold Time (ACM…REL)
- Total Facility Used (IAM…RLC)
- Drop call
- Traffic load
- Congestion

UniSS7 QoS Report module is capable to provide the following reports within a specific range of Start time, Stop time.

- ASR to a destination, by carriers
- Cause values to a destination, by carriers
- ASR, by destination via a carrier
- For a given traffic to a carrier
- Overall ASR by date and time
- Destination ASR by date and time
- Congestion for destination by carrier

For each of the counters that were monitored, the user can define the threshold values (e.g. for daytime, night-time and busy hour). If a threshold is exceeded an alarm event is generated. The following indexed must be evaluated against threshold.

- Number of Seizures
- Number of Answered calls
- Total Conversation Time (ANM…REL)
- Average Call Setup Time (IAM…ACM)
- ASR

UniSS7 is able to produce Traffic Statistics for ISUP and Calling Party Interface in time interval:

- ISUP (Number of ACM with no ANM, IAM with no ANM, IAM with no ANM with fast hook-up and Number of REL divided by cause and location)
- Calling Party Interface (Number of CP/CC with no connect, Setup with no Connect, Setup with no Connect for fast hook-up, Disconnect divided by cause and location and Setup with no connect and small duration)
- ISUP (Average, Minimum and Maximum Setup Time, Call Answer Time and Conversation Time)

Calling Party Interface (Average, Minimum and Maximum Setup Time, Call Answer Time, Call no Answer Time and Conversation Time)

UniSS7 is also able to indicate worst value of a Statistics for lowest and highest Thresholds

## E) Traffic and Network Planning Report Suite

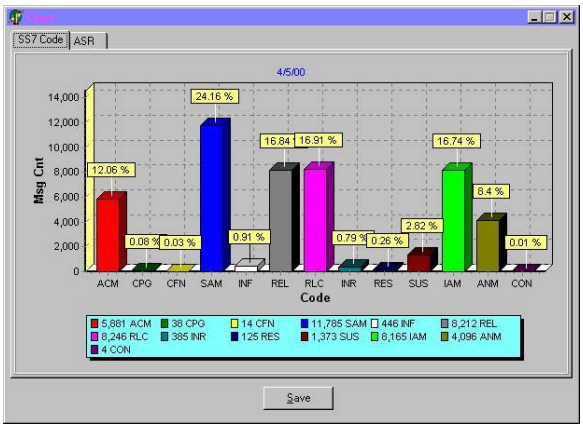
UniSS7 provides continuous real-time measurements on SS7 traffic across the network, providing immediate warning of abnormal activity that threatens network performance. This allows immediate action to be taken to avoid catastrophic failure. An immediate alert is produced when any of the user defined thresholds are breached.

**Features:**

- Immediate indication of revenue threatening conditions.
- Comprehensive, continuous real-time indication of the status and health of the SS7 and transmission networks.
- Prioritized list of all problem locations and their level of significance.
- Immediate feedback on the effectiveness of corrective actions.
- Easy integration with existing Operational Support Systems.

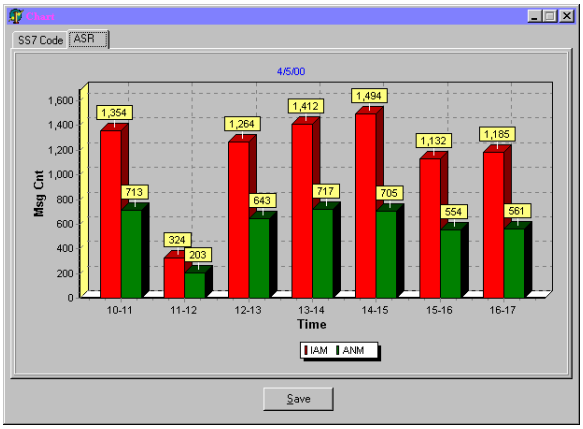
These real-time measurement allows the network operators to plan, design network management and implement changes to the International network based on information provided through Traffic Reporting.

UniSS7 allows the operator to monitor traffic performance per time slot, destination point code and originating point code based on user setting.




UniSS7 can assist in the management of trunk utilization requirements: Fluctuations in call volumes help determine trunk utilization requirements, Erlang versus time.

UniSS7 can help minimize lost callers and reduce long hold times: Traffic statistics are refreshed as often as every 60 seconds to pinpoint inbound traffic that needs to be rerouted or overflowed to a different terminating number.



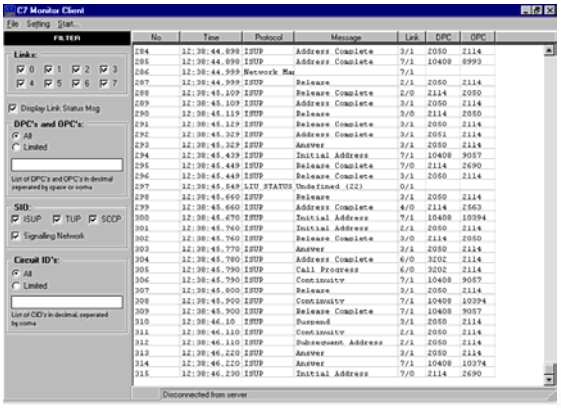

UniSS7 allows the creation of user define reports needed as below:

- Number of calls versus time/date by
  a) DPC
  b) OPC
- Traffic load
  a) by trunk (Erlang)
  b) by time slot (Erlang)
- Traffic volume for link sets by time
- CIC Load
  a) Number of calls by trunks
  b) Number of calls by time slots

The user can define Start time, stop time and date required for the above reports.

## F) Real-Time Call Trace Suite

Uniss7 is able to perform real time and off-line SS7 Call Trace on MTP, SCCP, ISUP, TUP, TCAP, and MAP signaling. This application traces calls across the network in real-time and diagnoses network problems reported by users or detected by the surveillance applications. It allows problems to be rectified easily and quickly.

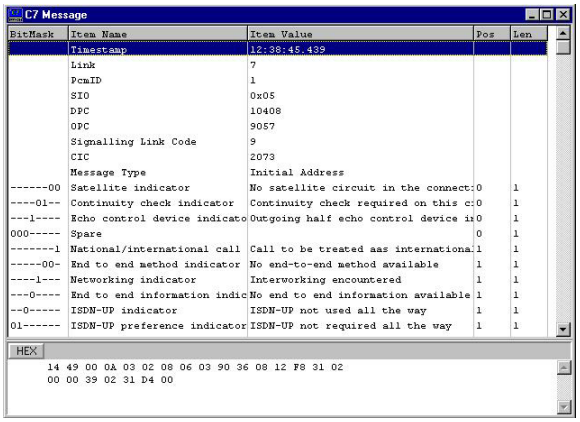


Detailed call flow records for each call, containing all signaling messages, addressing and routing information, quality metrics (delay, jitter), response and more.

Detailed service measurement records containing information on such measures as Answer Delay, and Call Duration.

## G) Protocol Analysis application Suite

This application allows investigation of SS7 messages on selected links and diagnoses network problems reported by network users or detected by the surveillance applications.




You can analyze SS7 message, from bits to octets, conveniently at your desktop. The protocol analyzer client software is simple to install, GUI-based, user friendly and feature rich.

## H) Mobile Roamer QoS Report Suite

Mobile roamers are considered a special group of users generates the highest profit for your network. Not only a premium call charge can be billed to these group of subscribers, they also belongs to the group that are not part of any calling plans with the bundled free minutes that means every call minutes is revenue to you.

Ensuring that your network provides the highest level of Quality of Server will keep these roamers in your network and keep generating profits for you while they travel. A roamer can easily switch to any of your competitors network on first signs of poor service. It could be in the form of poor coverage, unsuccessful call attempts, frequent call disconnections or even SMS that cannot be delivered.

UniSS7 Roamer QoS Report Suite provides an effective way for you to determine the quality of service for your various interconnect destinations. Having this information will enable your Network Planning people to prioritize the traffic routes for this roaming traffic.

UniSS7 Roamer QoS Report Suite provides the ability to monitor the roamer's request to register for service such as Location Update Request. Any degradation of service between you and partner network can be alerted via this report suite.

Critical information such as Authentication, Location Updates, and SMS arbitration allows you to have visibility of quality of service provided to your high-profit roaming customers.

| | Authentication Requests | Authentication Failures | Authentication Failures Percentage | Location Update Requests | Location Update Failures | Location Updates Failures Percentage | Cancel Location Requests | Cancel Location Failures | Cancel Location Failures Percentage |
|---|---|---|---|---|---|---|---|---|---|
| **Carrier A** | 20765 | 62 | 0.3 | 17363 | 868 | 5 | 545 | 22 | 4 |
| **Carrier B** | 12544 | 13 | 0.1 | 8973 | 179 | 2 | 322 | 10 | 3 |
| **Carrier C** | 58273 | 175 | 0.3 | 20893 | 1254 | 6 | 4543 | 227 | 5 |
| **Carrier D** | 34756 | 209 | 0.6 | 18464 | 554 | 3 | 654 | 39 | 6 |

# Benefits of UniSS7 Network Monitoring and Management Solutions

## Maximum Returns of Investment (ROI)

Operations, Planning, Marketing and Fraud departments can all simultaneously benefit from UniSS7 without conflict and degradation of performance, providing the maximum ROI.

## Vendor Independence

Quickly identifies and eliminates costly interoperability and performance issues, regardless of which vendors' equipment is deployed in your network, by capturing data directly from the signaling network.

## Scalable and Modular

Ensures your equipment is protected by an economical growth path that can accommodate flexible and scalable network expansion, and uses card-level and software-level upgrades.

## Enhanced Engineering and Planning Capabilities

Implements and refines network architectures to maximize the return of your capital investment using real-time and historical measures of network usage and service applications

# UniSS7 Technical Specifications

## UniSS7 Monitoring Server

- High Link capacity, high local storage, high processing power, high real time monitoring capacity per 19" rack mount (SS7 monitor server) with highly scalable signaling links
- Each monitoring server can be chained through the rack through Ethernet LAN
- Database Server with RAID 5 security (data redundancy, hot plug disks).Storage capacity scalable per request
- Database server connection to SS7 monitoring server
- Real-time generation of CDRs for all call attempts
- Captures real-time Q.752 events, alarms and counters
- ITU Q.752 SS7 network monitoring recommendation compliant
- Monitoring server supports various leading SS7 DSP hardware modules, including Intel Datakinetics SS7 products

## UniSS7 Client Applications

- Standard ODBC access to database server
- CDRs Analysis
- Circuit-related Protocol Analysis: ISUP, TUP, etc
- Non-circuit related Protocol Analysis: SNM, SCCP and BER/ANSI encoded protocols TCAP, MAP, INAP (GSM, intelligent network)
- Traffic Analysis: Network and Business-oriented applications (Traffic engineering, Maintenance, Interconnection Arbitration, targeted marketing studies etc)
- Supported multiple Operating System: WinNT/2000, Solaris, Linux
- User Friendly Graphical User Interface

## Network Surveillance Function

1) Non-Intrusive Tapping
2) Support for unchannelized E1 (128K, 256K up to 2Mbits)
3) Invalid MSU real tine reporting
4) Signaling Link measurements/statistics (e.g., Out of Sync, Out of Service, Processor Outage, etc.)
5) Signaling Network Management (i.e., Display worst links or point codes. Criteria to be defined by user. E.g., highest ratio of REL to IAM/IAI, abnormal REL causes, etc.)
6) SS7 Traffic Performance:
   a) Point codes receiving worst service from the network. (Criteria to be defined by user)
   b) Point codes closest to overload
   c) Links encountering congestion
   d) Signs of mass calling events, identifying terminating SSP and called number
   e) Network level faults
   f) Faults with the services that depend on the C7 signaling network
   g) Unavailability periods of signaling points, links, routes and determine if these exceed the set objective
7) Alarm and report generation for defined events and thresholds exceeded
8) Real-time and Historical call trace
   a) Trace of up to 100 called/calling number combination
   b) TUP/ISUP call trace based on defined release causes
   c) Trace for user defined failed call parameters
   d) Trace for short duration calls, with the user able to define "short duration"
   e) Trace for long duration calls, with the user able to define "long duration"
9) Call Trace Correlation (i.e., the system must be able to show all messages related to a particular call)
10) Others:
    a) Filtering (i.e., Real-time and Post capture filter messages that are of interest to the user.
    b) Start/Stop triggers
    c) Protocol Analysis (i.e., Messages must be times tamped and be able to be decoded for further analysis.)
11) Alarms
    a) Easy visual identification of SS7 network faults
    b) Audible alarm for thresholds exceeded (e.g., link overload, illegal messages, transmission error rate etc.)
    c) Event logging of all alarms
12) Data collection
    a) Variable hour moving window storage
    b) Decode and analysis for "freeze" window of raw data
    c) Recording of all messages, traffic data, and performance statistics in real-time up to 100% MSU occupancy

## Protocol Support

MTP

- ITU-T Q.700-Q.707 Message Transfer Part
- ITU-T Q.791 Monitoring and Measurements
- ANSI T1.111 –1992 Message Transfer Part

ISUP

- ITU-T Q.761-Q.764
- ITU-T Q.730 ISDN User Part supplementary services
- ITU-T Q.767 Application of the ISDN user part of CCITT signaling system No.7 for International ISDN interconnections
- ETSI ETS300-356-1 v2
- ANSI T1.113 Integrated Services Digital Network(ISDN) user part

SCCP

**Connectionless Operation Part**

- ITU-T Q.712 Definition and function of signaling connection control part message
- ITU-T Q.713 Signaling Connection Control Part formats and codes
- ITU-T Q.714 Signaling connection control part procedures
- ETSI ETS 300 589
- ANSI T1.112 Signaling Connection Control Part

TCAP

- ITU-T Q.771 Functional description of transaction capabilities 1998,1993
- ITU-T Q.772 Transaction capabilities information element definitions 1998, 1993
- ITU-T Q.773 Transaction capabilities formats and encoding 1988, 1993
- ITU-T Q.774 Transaction capabilities procedures 1998, 1993
- ITU-T X.680 Specification of Abstract Syntax Notation One (ASN.1)
- ITU-T X.690 Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)
- ETSI ETS 300 134 Transaction Capabilities Application Part (TCAP) 1992
- ETSI ETS 300 287 Transaction Capabilities Application Part v 2 (TCAP) 1993
- ANSI T1.114 Transaction Capabilities Application Part

MAP

- GSM-09.02 V7.5

INAP

- ETSI ETS 300 374 –1 Intelligent Network CS1 Specification
- X.208 Specification of Abstract Syntax Notation One (ASN.1)
- X.209 Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)
- Q.773 SS7 Transaction Capabilities Formats and Encoding
- X.680 Specification of Abstract Syntax Notation One (ASN.1)
- X.690 Basic Encoding Rules for Abstract Notation One (ASN.1)
- Q.1218 ITU-T Interface Recommendation for Intelligent Network CS1
- GSM 09.78 (ETSI TS101 046 V5.6.0) CAMEL Application Part V1
- GSM 09.78 (ETSI TS101 046 V6.3.0) CAMEL Application Part V2
- CAMEL Application Part V3 under development