

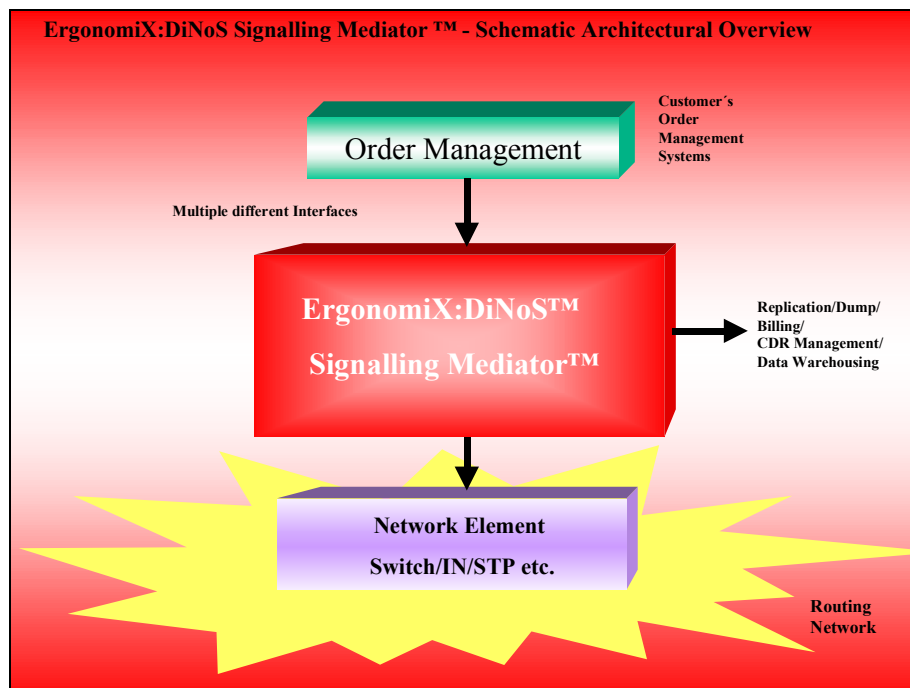


ErgonomiX:DiNoS Signalling Mediator™

ErgonomiX:DiNoS™ is a scalable Number Management System (NMS) with different editions and various features.

Imagine:

- Are You supporting Fixed Network Numbers and / or Mobile Network Numbers?
- Are You searching for a specific mediator which can combine all your various, individual interfaces?
- Do you have to find a way for provisioning several / different signalling products?
- Do you have to provision different network elements with the same system?
- Do you have to take care that your mated network element pair architecture is provisioned correct in your network?
- Are You searching for a system which knows what data distribution is, so that different network elements gets different data according to your network architecture?
- Are You searching for a system to reduce the costs of your associated network element recourses (like HLR) by using algorithms you can define?
- Do You need a solution to support Number Portability (for Service Numbers, Subscriber Numbers and / or Mobile Numbers) within your network in parallel with activation of own numbers and services and blocking features in one single system?
- Do You have to find a way to combine the provisioning of your network with parallel usage of service blocking facilities?
- Haven't You decided yet which technique you will use for provisioning of VoIP numbers but need a central database in your company and an element manager which will provision the data you need, what ever network element will be used in your company in the future?
- Do You need a central database in Your OSS / Network for Routing?



With the ErgonomiX:DiNoS Signalling Mediator™ product you will get the answer to all your questions.

ErgonomiX:DiNoS Signalling Mediator™ Release 1.2 Technical Data Sheet

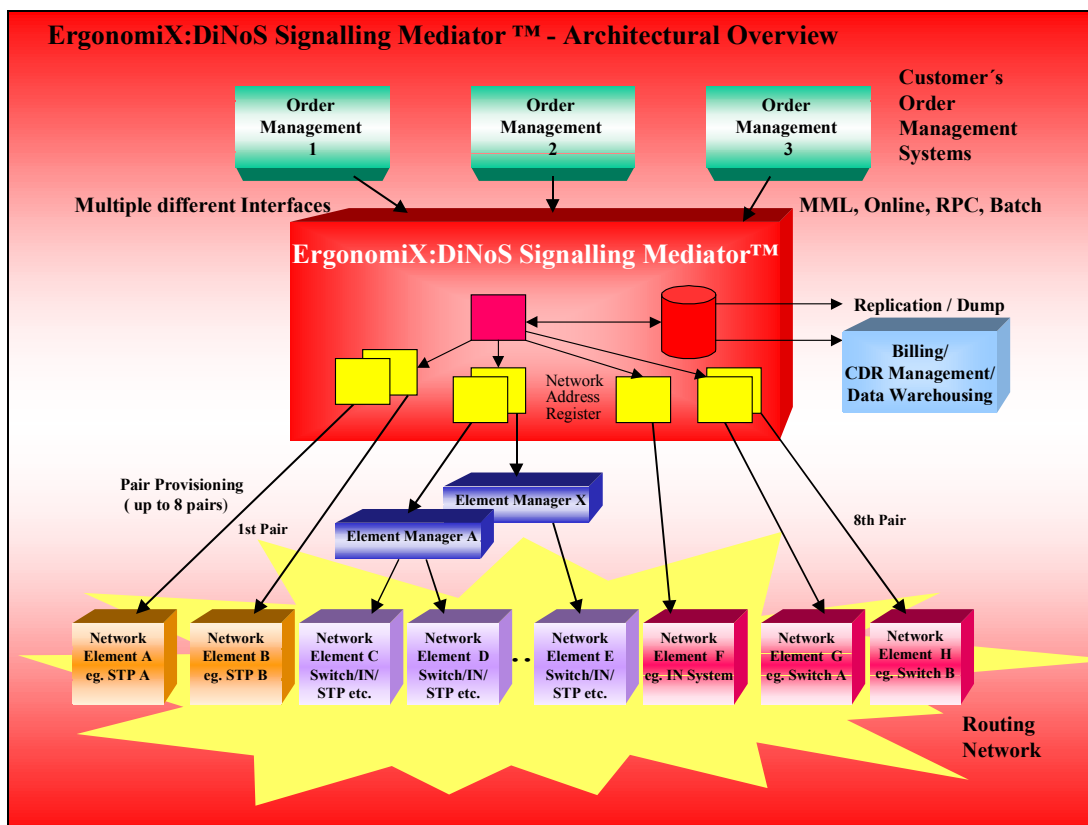
GENERAL DESCRIPTION

Depending on the main business of a Telecommunication Network Operator the ErgonomiX Signalling Mediator™ can be used in different ways:

- as an universal Order Management Adapter
- as the single Central Number / Numbering Management Application within the own company
- as a universal Routing / Signalling Provisioning System
- as a Number Portability Implementation System

or as a utilisation of all features in conjunction.

The ErgonomiX Signalling Mediator™ offers a software solution for mediation between high level orders and signalling information for telecommunication network operators in an increasingly competitive deregulated market.



The ErgonomiX product is not only capable of setting northbound orders from one format in another format to create southbound orders like other mediators. The major advantage is, that the ErgonomiX product is a Number Management System. The system combines the Business Support System (BSS) world with the Operational Support System (OSS) one. If the BSS responsible persons are talking about services it means something quite different than services in the OSS world. E.g. most network elements are not aware of the association between an IMSI and the according MSISDN so if a BSS system wants to change the HLR of an IMSI it's just one single command – but up to 11 commands to the network elements. So the Signalling Mediator™ does not simply mediate an order.

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With the Signalling Mediator™ ErgonomiX provides a solution for functions, interfaces and performance to interface with any kind of Business Support System like for example a Customer Care System, Fraud Protection, Billing System or a national database centre, for example. The Signalling Mediator™ is able to support different BSS interfaces on multiple channels in parallel.

The Signalling Mediator™ product supports the provisioning needs of:

- Mobile Network Operators who also want to have the direct provisioning for ported fixed network numbers,
- Fixed Network Operators (service numbers and / or subscriber numbers) including the possibility of direct provisioning of ported mobile numbers,
- Network Operators who have an integrated network with mobile numbers as well as fixed network numbers (service numbers and subscriber numbers).

All these data can be supported and provisioned in parallel.

The ErgonomiX Signalling Mediator™ product adapts to most provisioning and order management interfaces in non-homogeneous customer environments.

Depending on the network architecture the ErgonomiX Signalling Mediator™ is able to provision different kinds of network elements or other management systems in parallel. Depending on the configuration, the Signalling Mediator™ provides Element Manager capabilities for mated pair provisioning and scheduled provisioning in case a network element within a pair configuration is temporarily not available.

In addition, it provides sophisticated data collection, data presentation, replication and provisioning capabilities.

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TECHNICAL SPECIFICATIONS

Operating Systems

- HP UX™ 11i
- Sun Solaris™, Solaris 8, Solaris 9, Solaris 10
- IBM AIX™, LINUX™ Server upon request



Capacity

- Supports up to 8 Network Element pairs (up to 16 Network Elements) in the basic configuration. A Network Element can be a Switch, an STP, a SoftSwitch, another Element Manager or an IN system.
- The Signalling Mediator™ product is scalable, therefore if more Network Elements have to be provisioned it is just a question of hardware and configuration.

Database

- Oracle® RDBMS is utilised as the product's internal data store.
- A database abstraction layer shields the application code from specific database access code. By exchanging this layer, the adaptation to different database products is possible.

Hardware Platforms

The architecture of the Signalling Mediator™ product is very flexible and scalable. The hardware can be chosen depending on the amount of parallel North-bound interfaces and amount of connected South-bound channels.

The following list is an example for the most popular combination of supported Network Elements and amount of numbers to be stored within the database.

Hewlett Packard Server®

- HP 9000 rp3440-2 Server or equivalent for operation with a single pair of Network Elements and up to 3 Million Numbers / Orders
- HP 9000 rp3440-4 or equivalent for operation with up to 16 Network Elements and up to 75 Million Numbers / Orders or with combined IMSI / MSISDN ALR application

Sun Microsystems Server®

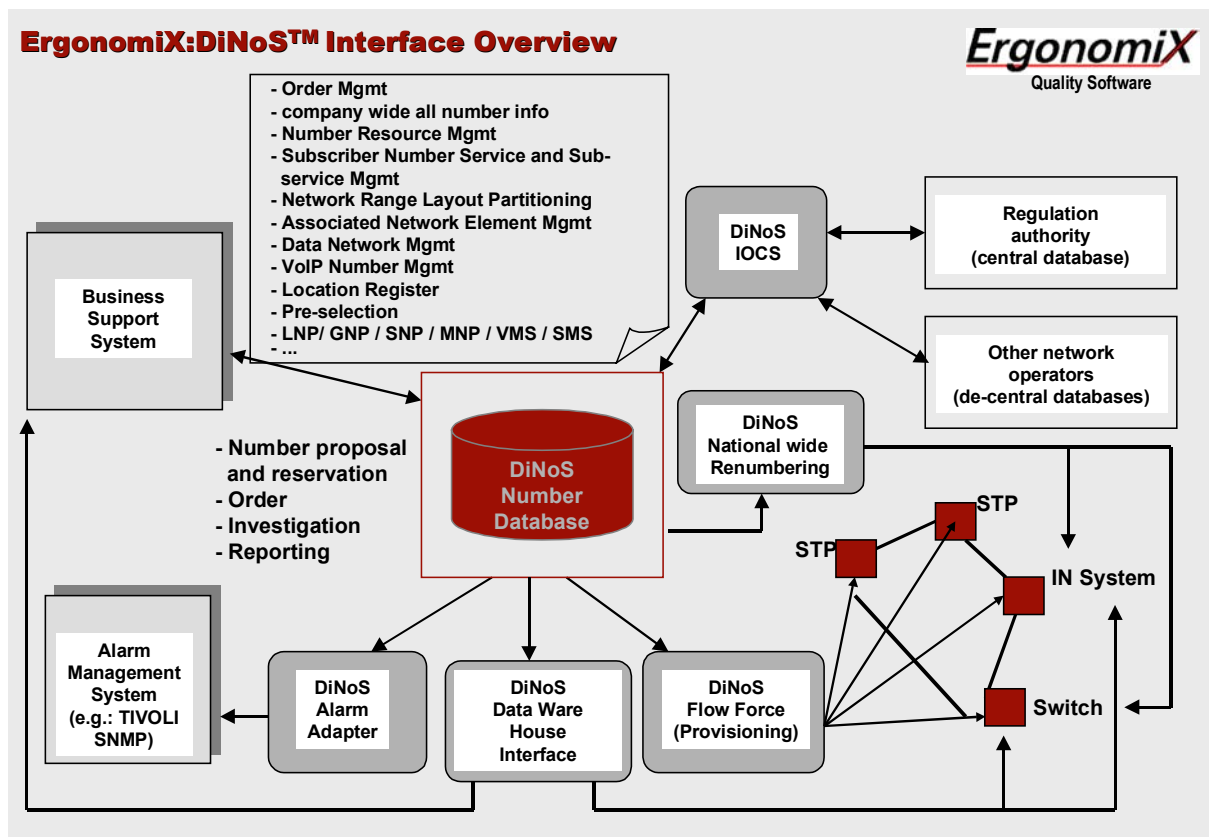
- Sun Fire™ V240 or equivalent for operation with a single pair of Network Elements and up to 3 Million Numbers / Orders
- Sun Fire™ V440 or equivalent for operation with up to 8 Network Elements and up to 16 Million Numbers / Orders
- Sun Fire™ V880 or equivalent for operation with up to 16 Network Elements and up to 75 Million Numbers / Orders or with combined IMSI / MSISDN ALR application

The hardware scaling also depends on the average amount of additional load in terms of GUI / reporting transactions.

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Interfaces

- TCP/IP over Ethernet
- RPC
- Support of provisioning to multiple Network Element instances for large networks
- Parallel interfaces prepared to provision other network elements
- Synchronous and asynchronous provisioning interfaces
- HTML / Web client providing User access through standard Web browsers
- Asynchronous messaging interfaces
- Batch file Processor (order acquisition, number status query, permanent data warehouse, etc.)
- Direct database access interfaces (for selected SQL tables and views)
- Data Extractor (integration with Billing, Data Warehouse, CDR–Mediation, etc.)
- Alarm Management Interface via SNMP
- Alarm escalation interface (e.g. e-mail, fax)
- Central porting database interface (e.g. for exchange with a national numbering database as an additional module)
- Routing provisioning interface



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High Availability

- Redundant duplex configuration available (Warm Standby, Hot Standby, Hot Standby with Auto-fail-over).
- In case of usage of the Auto-fail-over feature, individual configuration of the fail-over scenarios possible.
- Support of Disk Mirroring via integrated standard products.
- Two different replication configurations supported:
 - Oracle® Multi Master Replication
 - and log shipment configuration available.
- Planned downtime of no more than 8 hours per year can be achieved depending on operation procedures.
- Supports duplex configuration with hundreds of kilometres between both servers.

Architecture

- Modular, non-blocking, distributed messaging architecture.
- Allows to exchange, update modules without outage.

FEATURES / BENEFITS

Applications

<p>Supports</p> <ul style="list-style-type: none"> ➤ VoIP Routing ➤ Service Blocking ➤ Blocking for Called / Calling Party ➤ CLIV support ➤ Service Location Register (MSISDN or IMSI / MSISDN based) ➤ Mobile Location Register (MLR) for flexible routing ➤ International Mobile Subscriber ID based Mobile Location Register (IMSI / MSISDN MLR) ➤ Local Number Portability (LNP) ➤ Geographic Number Portability (GNP) ➤ Service Number Portability (SNP) ➤ Mobile Number Portability (MNP) ➤ Short Message Service (SMS) routing ➤ Voice Mail Service (VMS) routing ➤ Generic Routing with multiple routing codes 	<ul style="list-style-type: none"> ➤ Integration of several high level routing oriented services in a single software.
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Manages Number Portability applications: LNP, MNP, SNP, GNP, and MLR

<ul style="list-style-type: none"> ➤ Receives NP data from regulatory authority or customers order management system and updates the underlying Network Elements. ➤ Ensures databases are synchronised across multiple Network Elements. 	<ul style="list-style-type: none"> ➤ Reduces operational costs of managing NP records.
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Manages CLIV and other Blocking applications

<ul style="list-style-type: none"> ➤ Receives Service Blocking information from customers order / service management system or fraud prevention system. ➤ Supports: Service Blocking, Blocking for called / calling party. ➤ Ensures databases are synchronised across multiple Network Elements. 	<ul style="list-style-type: none"> ➤ Reduces operational costs of managing CLIV and other Blocking records.
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Direct electronic connections to Network Elements and or Element Manager

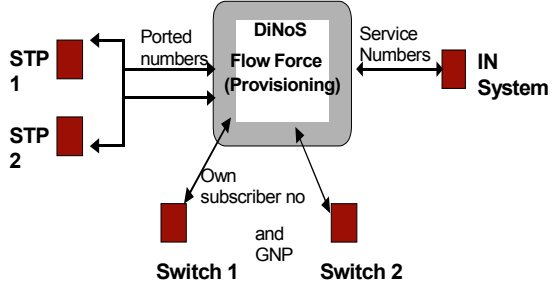
<ul style="list-style-type: none">➤ Redundant links to all connected network element instances which support redundant links (e.g. TCP/IP based).➤ Link supervision for ACTIVE and STANDBY machine in duplex configuration.➤ Support for multiple / different Network Elements, Element Managers, IN systems.➤ The Signalling Mediator™ mediates between any Routing / Service Provisioning related order in any format and the routing network (STP, switch/exchange, IN, etc.) itself.➤ Shields the routing network from the difficulties and peculiarities of any protocol or format, service orders may be provided on an OSS level.➤ Shields the North-bound order oriented system from the access protocols and specifics of routing network provisioning.➤ Mediates between synchronous and asynchronously operating provisioning if necessary.➤ Configurable Error Toleration in case of manual intervention directly on a Network Element.➤ Support of multiple orders within one single provisioning transaction in case the according Network Element Interface needs such procedure.	<ul style="list-style-type: none">➤ Routing Networks of any size and structure can be deployed.
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Supports provisioning of Network Elements in pairing configurations

<ul style="list-style-type: none">➤ Pair wise updating and resynchronisation supported.➤ In case one of the Network Elements in a pair configuration is temporarily not available, automatic scheduled provisioning will be activated.	<ul style="list-style-type: none">➤ Makes pair provisioning of Network Elements easy to manage.
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Provisioning Data Distribution

<ul style="list-style-type: none"> ➤ Provisioning information can be distributed among connected Network Elements or Element types. ➤ Attached IN equipment may receive different information than attached SS7 or Switch equipment (e.g. all information about Service Numbers will be provided to the connected IN system, all information about Mobile Numbers will be provided to STP 1 and 2 and all Subscriber Number Information will be provided to Switch 1 and 2).. ➤ Information distribution can be based on service type, number range etc. ➤ Rules / algorithms for the determination of information distribution can be customised. 	<ul style="list-style-type: none"> ➤ Provides additional architectural options for the network operators routing network. 
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MML Language Interfaces

<ul style="list-style-type: none"> ➤ MML commands for all service applications in a common format in place. ➤ Multi Channel RPC MML processing. ➤ Multi Channel Telnet based MML processing. ➤ Multi Channel Terminal mode based MML processing . ➤ Multi Channel Batch MML processing (Synchronous and asynchronous provisioning). 	<ul style="list-style-type: none"> ➤ Simplifies integration and deployment for North-bound interfaces.
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Order Management Adaptation

<ul style="list-style-type: none"> ➤ Flexible, Modular Architecture. ➤ Link supervision for North-bound interfaces. ➤ Multiple North-bound Modules. ➤ North-bound channelling. ➤ Signalling Mediator™ easily uses already available interfaces for internal use and just plugs in a customer individual North-bound interface. ➤ Fixed prices available for individual customising of additional North-bound interfaces. 	<ul style="list-style-type: none"> ➤ Makes adaptation to customer individual North-bound provisioning protocols easily possible. ➤ Pricing for individual adaptations are fixed prices.
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Database Management

<ul style="list-style-type: none"> ➤ Manages own number blocks and those of other carriers. ➤ Manages information about local area codes. ➤ Manages information about service codes. ➤ Manages information about mobile codes. ➤ Manages information about national short codes. ➤ Manages the corresponding national plausibility rules for Service Numbers, Mobile Numbers and Subscriber Numbers. ➤ Administers data related to other network operators. ➤ Manages information about Connected Network Elements (e.g. STPs, Element Manager, any kind of Network Element). ➤ Manages information about Associated Network Elements (e.g. HLRs for MNP or Hosts for LNP). ➤ Administration of Associated Range Layout for default routing purposes. ➤ Management of information about exchange gateways for LNP. ➤ Database occupation threshold checker. 	<ul style="list-style-type: none"> ➤ Enhances revenue generation. ➤ Ensures number changes are propagated to databases in network elements as quickly as possible ➤ Ensures number databases on network elements remain synchronised with each other.
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Additional Features for Mobile Networks

<ul style="list-style-type: none"> ➤ Automatic HLR capacity / utilisation ratio management for application: IMSI / MSISDN Location Register. ➤ HLR proposal rules can be configured (e.g. round robin or according percentage rules). 	<ul style="list-style-type: none"> ➤ Central Number Management ensures all information within one database.
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Data Warehouse

<ul style="list-style-type: none"> ➤ Data Warehouse interfaces for providing numbering / porting data to other applications for Billing, CDR Mediation purposes. 	<ul style="list-style-type: none"> ➤ Central capacity supervision for associated Network Elements.
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Open System

<ul style="list-style-type: none"> ➤ Applications and interfaces use open standards. 	<ul style="list-style-type: none"> ➤ Increases customer efficiency. ➤ Simplifies implementation.
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Scalable

<ul style="list-style-type: none"> ➤ System hardware size is determined by number of network elements to be managed as well as the amount of database entries to be stored. 	<ul style="list-style-type: none"> ➤ Supports up to 16 connected Network Elements (8 pairs) in base configuration. ➤ Management of higher amount of connected Network Elements is possible.
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Access Management

<ul style="list-style-type: none"> ➤ Access control on application level. ➤ Layered access control for functions and sub-functions. ➤ Application-level management. ➤ Layered access and control. ➤ Separate authorisation configuration for menus, windows, functions for GUI usage. 	<ul style="list-style-type: none"> ➤ Easy user and user-group relationship configuration. ➤ Secure access to information.
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Number Data Exchange

<ul style="list-style-type: none"> ➤ Porting data acquisition facility. ➤ Porting notification facility. ➤ Service activation notification facility. 	<ul style="list-style-type: none"> ➤ Provides central point for co-ordinating and synchronising information on multiple network systems. ➤ Allows provision of relevant information for billing purposes.
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Record logs / System logs

<ul style="list-style-type: none"> ➤ Records each user interface activity (Traffic logs for North-bound and South-bound interfaces). ➤ Logs all operations on database level. ➤ Generates system logs. ➤ Logs electronic provisioning activities. ➤ Integrates message catalogue for log, trace, or alarm messages. ➤ View of all application logs via GUI available. 	<ul style="list-style-type: none"> ➤ Generates logging / tracing reports and administration. ➤ Complies with regulatory record keeping.
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Alarm Management

<ul style="list-style-type: none"> ➤ Customised priority / severity configuration depending on the individual network operator needs. ➤ Three-step alarm process logs and records alarm responses. ➤ Alarm query log. ➤ Automatic alarm clearing. ➤ SNMP alarm agent. ➤ Other alarm agents (e.g. e-mail forwarding) available and configurable. ➤ Alarm management via GUI. ➤ Real-time alarm view via GUI. 	<ul style="list-style-type: none"> ➤ Can provide central location for alarm monitoring of multiple network elements.
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ITU-T E.164 compliant / National Numbering Plan

<ul style="list-style-type: none"> ➤ Standard format used for networks with E.164 compliant numbering plans. ➤ National numbering plan information and according specific rules are configurable. ➤ Support of closed numbering and open numbering (depending on the national numbering plan). ➤ Storing all necessary relationships of a number. ➤ Monitoring of own number block resources. ➤ Support of several status for numbers. ➤ Manual correction options for all kinds of incorrect import data. ➤ Research options for all types of numbers. ➤ Keeping history of numbers, number ranges, their status and their associations 	<ul style="list-style-type: none"> ➤ Can be configured for any existing numbering plan.
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Single database

<ul style="list-style-type: none"> ➤ All information is stored in a single Oracle® database with full Oracle query / replication capability. 	<ul style="list-style-type: none"> ➤ Flexible query facilities. ➤ “Mines” and centralises numbering information.
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Ease of implementation

<ul style="list-style-type: none"> ➤ System runs on standard UNIX server. 	<ul style="list-style-type: none"> ➤ Reduces time for deployment. ➤ Reduces implementation costs.
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High Availability

<ul style="list-style-type: none"> ➤ Support of Disk Mirroring. ➤ Supports duplex configurations with Hot Stand-by and Auto-fail-over capabilities. ➤ Rules for Auto-fail-over can be customised. ➤ Supervision of the links to the connected network elements. ➤ Database Replication utilising Online Redo Log File Transfer or Oracle Multi Master Replication. 	<ul style="list-style-type: none"> ➤ Enhances the availability of numbering / porting / blocking information for any purpose.
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Dump to Network Element

<ul style="list-style-type: none"> ➤ Individual dump to Network Elements: provides additional backup source for network element reload. ➤ Each Network Element dump format of the different Network Element companies which is already official available is included in the product. ➤ Fixed prices for any new Network Element Dump format – abating the commercial risk in business calculations regarding a change to or add on of a new kind of Network Element 	<ul style="list-style-type: none"> ➤ Gains flexibility for network reconfiguration / upgrading or Network Element exchange.
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Miscellaneous

<ul style="list-style-type: none">➤ On-line help for every application window.➤ Printing from every application window.➤ Export of application data for statistic purposes.➤ Provides a buffering instance with access facilities for hundreds of Users for data capture / investigation purposes.	<ul style="list-style-type: none">➤ One centralised instance which is able to provide numbering information for statistical purposes, sales activities, billing or mediation purposes.
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GENERAL AVAILABILITY

- The implementation of the ErgonomiX:DiNoS™ product started Mid 1997. From the beginning, requirements and recommendations from a lot of telecommunication companies – operators, carriers and suppliers - did influence the product implementation. Therefore since 1997 a continuous product development with new editions, features, functions is in place. International customers have influenced the priority of developed enhancements.
- Since January 1998 the ErgonomiX:DiNoS™ system is in production at different network operators.
- The ErgonomiX Signalling Mediator™ Release 1.1 is general available since Summer 2005.
- The ErgonomiX Signalling Mediator™ Release 1.2 is general available since January 2006.

CONTACT INFORMATION

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Partner Information

This Technical Data Sheet was handed over by