Intelligent Network Solution
For converged networks
IN SOLUTIONS FOR CONVERGED NETWORKS

C-DOT offers scalable, cost-effective and versatile integrated wireline and wireless Intelligent Network (IN) solutions comprising Service Control Point (SCP), Service Management Point (SMP), Specialized Resource Point (SRP), Service Creation Environment Point (SCEP) and Service Switching Point (SSP). These can be used for quick deployment of feature-rich value-added telecommunication services for the wireline, GSM & CDMA wireless and the Internet Protocol (IP) networks. Each node is individually scalable to meet the growing demand for services in a cost-effective manner. The solutions are compliant to ITU-T, ETSI and IETF standards and are ready for multivendor multi-service networks.

C-DOT is adhering to the evolutionary path defined by ITU-T for developing new services by exploiting the evolving media processing and signaling capabilities of the underlying networks. This approach, coupled with modular software and hardware architecture of C-DOT IN nodes, helps the telecommunication carriers and service providers in protecting their investments over a longer period of time.

C-DOT IN solutions are endowed with a rich service portfolio and possess the benefit of our experience of successful commercial operation of IN services all over India since 1998.

**Rich Portfolio of Services**

**Prepaid and Credit Card Calling**
- Prepaid card for Wireless (PPW) (with full automatic roaming using CAMEL)
- Virtual Card Calling (VCC)
- Account Card Calling (ACC)
- Credit Card Calling (CCC)

**Personal Services**
- Universal Access Number (UAN)
- Universal Personal Telecommunications (UPT)

**Enterprise Services**
- Toll-free (Free phone)
- Premium Rate (PRM)
- Mass Calling (Televoting)
- Virtual Private Network (VPN)

**Enterprise Services**
- Internet Call Waiting (ICW)
- Click to Dial (CTD)

**Regulatory Services**
- Fixed Number Portability (FNP)
- Mobile Number Portability (MNP)

**Nodes Offered**
- Service Control Point (SCP)
- Service Management Point (SMP)
- Specialized Resource Point (SRP)
- Service Creation Environment Point (SCEP)
- Service Switching Point (SSP)*

**Standard Compliance**
- ITU-T Q.120X, Q.121X, Q.122X, Q.123X and Q.124X for IN services
- ETSI Core INAP CS 1 and 2
- ITU-T Q.71X (SCCP) and Q.77X (TCAP)
- ITU-T Q.70X (MTP)
- Q.752 (Monitoring and Measurements)
- ITU-T Q.76X (ISUP)
- ETSI 3GPP CAMEL Phase 2 and 3
- 3GPP2 WIN Phase 2
- 3GPP2 N.S0018
- 3GPP2 X.S0010-A
- IETF SIP (RFC 3261), PINT and SPIRITS
- Carrier grade NEBS compliant
- C-DOT DSS MAX offers integrated PSTN, ISDN, V5.X and SSP capability.
**Specialized Resource Point (SRP)**

The Specialized Resource Point (SRP), also referred to as the Intelligent Peripheral, provides centralized media resources for IN call handling. It interfaces with the bearer networks via the MSC/SSP and with the SCP for control communication. The C-DOT SRP is designed to meet the growing demand for specialized resources like speech recognition, text to speech conversion and text to fax conversion along with the conventional resources like playing announcements & tones, collecting DTMF digits, etc. during the course of IN service calls. By using the SRP, the users can also do voice-based activation/deactivation of services and voice-activated dialling.

Distributed architecture of the SRP separates the network connectivity and voice processing capabilities from the applications. This has the advantages of deployment flexibility, scalability, reusability and efficient use of media and signaling resources. It is capable of handling very high call volumes, with dedicated resources per port to ensure that the platform performance never degrades. For OA&M, user-friendly GUI is provided for centralized configuration, error and performance monitoring with the help of detailed call logs and traffic counters.

**System Capabilities**

- Play messages and customized announcements
- Tone generation
- DTMF digit collection
- Store and forward fax
- Multiparty conferencing
- Bridging
- Text to fax conversion
- Automatic speech recognition
- Text to speech conversion
- Speech to text conversion
- Voice record and playback
- Speech detection and fax tone detection
- Execute user interaction scripts
- Receive and transmit data from and to SCP, adjunct and MSC
Key Benefits to Service Providers

- Centralised provisioning of media resources, hence better utilization and quick deployment
- Highly available, scalable distributed architecture - it grows with your needs. Can also be used in a standalone mode
- Simultaneously communicates with multiple SCPs
- Open to interoperate with MSC/SSP and SCP of any vendor that supports standard protocols

Applications

- Network Announcement Server
- Televoting
- Interactive Voice Response
- Voice Mail Server
- Voice Activated Dialing and other Voice Activated Services
- Voice Portal
- Customized ( Colored”) Ring-back Tones

Standards Compliance

<table>
<thead>
<tr>
<th>Platform Specifications</th>
<th>Fixed Line</th>
<th>CDMA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Processor</strong></td>
<td>Intel X86</td>
<td>ITU-T Cs1</td>
</tr>
<tr>
<td><strong>Operating System</strong></td>
<td>Linux</td>
<td>ITU-T Cs2</td>
</tr>
<tr>
<td><strong>Speed</strong></td>
<td>2.0 - 3.0 Ghz</td>
<td>3GPP2/TIA/EIA/IS4D-1</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>Up to 32 GB</td>
<td>IS-771, WIN Phase 1</td>
</tr>
<tr>
<td><strong>E1 Ports</strong></td>
<td>480 - 2880</td>
<td>IS-848, WIN Phase 2</td>
</tr>
<tr>
<td><strong>Database</strong></td>
<td>Oracle/MYSQL</td>
<td>IS-826, Pre-paid Charging</td>
</tr>
</tbody>
</table>

Low Capacity SRP
The Service Control Point (SCP) epitomizes the "intelligence" in an Intelligent Network. It directs the wireline and wireless bearer network nodes (SSPs) on call routing and completion. It holds the Service Logic Programs (SLPs), tariff & charging data and subscriber profiles. It interfaces with the Service Management Point (SMP) for OAM functions, with the Specialized Resource Point (SRP) for playing multimedia content to IN service users and with the Service Creation Environment Point (SCEP) via the SMP.

**Single, Scalable Powerful System for Diverse Networks**

The C-DOT SCP provides the operators with the flexibility of provisioning services for any type of network viz. wireline, GSM, CDMA and IP. Available in a number of platform choices, it can be expanded in capacity as well capability as the need arises. It works on standard, open protocols and, therefore, can interoperate with bearer network nodes of any vendor supporting the standard protocols. The SCP can handle 8,00,000 BHCA (expandable further) and supports up to 128 E1s.

**Rich Portfolio of Services and Features**

The service providers can utilize the rich portfolio of value added services and features for new revenue streams and preventing churn. Prepaid and Credit Card Calling services, enterprise services such as Toll-free and VPNs, regulatory services like Number Portability, services for the Internet users and personal services such as UPT and UPN can be offered to different customer segments.

**Flexible Operator-defined Charging Plans**

The SCP provides the service providers with the flexibility to govern the charging patterns for IN services. The operator can define and manage complex tariff plans on the basis of distance, time and IN service.

**Flexible Operator-defined Charging Plans**

The SCP is available on very cost-effective off the shelf hardware platforms. The operators may choose from a range of systems starting from an entry level fault-tolerant system to high availability cluster system for high traffic requirements. These platforms are scalable in terms of call handling, E1and SS7 connectivity. The network provider can ramp-up investment in line with the traffic and revenue growth.
Key Benefits to Service Providers

- Rapid and risk-free deployment of new services
- Single investment for diverse bearer networks
- Scalable architecture allows investment ramp-up in line with return on investment
- Open interfaces for multi-vendor infrastructure
- Easy to manage and configure
- Lifetime support guarantee

Standards Compliance

<table>
<thead>
<tr>
<th>Fixed Line</th>
<th>ETSI Core INAP CS1, CS2</th>
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</thead>
<tbody>
<tr>
<td>GSM</td>
<td>ETSI 3GPP CAMEL Phase 2</td>
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<tr>
<td>CDMA</td>
<td>3GPP2 WIN Phase 2</td>
</tr>
<tr>
<td></td>
<td>3GPP2 N.S0018</td>
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<tr>
<td></td>
<td>3GPP2 X.S0010-A</td>
</tr>
<tr>
<td>IP</td>
<td>IETF SIP RFC 3261 PINT and SPIRITS</td>
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</table>

Platform Application

<table>
<thead>
<tr>
<th>Processor</th>
<th>Intel X86</th>
<th>PA-RISC</th>
<th>Alpha</th>
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</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>Linux</td>
<td>Unix</td>
<td>Unix</td>
</tr>
<tr>
<td>BHCA</td>
<td>50 K &amp; above</td>
<td>100 K &amp; above</td>
<td>800 K &amp; above</td>
</tr>
<tr>
<td>Speed</td>
<td>2.4 Ghz</td>
<td>180 Mhz</td>
<td>1.2 Ghz</td>
</tr>
<tr>
<td>Memory</td>
<td>512 MB to 6 GB</td>
<td>512 MB to 4 GB</td>
<td>1 GB to 16 GB</td>
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<tr>
<td>Storage</td>
<td>Up to 108 GB</td>
<td>Up to 90 GB</td>
<td>Up to 2 TB</td>
</tr>
<tr>
<td>E1 Ports</td>
<td>Up to 16</td>
<td>Up to 16</td>
<td>Up to 8 per node</td>
</tr>
<tr>
<td>Database</td>
<td>Oracle</td>
<td>Oracle</td>
<td>Oracle</td>
</tr>
</tbody>
</table>
The Service Management Point (SMP) provides integrated Operation, Administration & Maintenance (OA&M) and Operations Support System (OSS) functionality for the Intelligent Network (IN) system. From a single-node Linux box to a four-node Linux/Tru64 cluster, the SMP is configurable to suit every operator’s needs. In a small sized integrated offering (SSIN), the SMP and SCP share the same platform.

Built on a modular design on the tri-layer architecture using Enterprise Java Beans (EJB), the SMP offers a platform independent business layer and lightweight web-based user interface for hasslefree client installation and operations.

**Voucher Management System**

The VMS is used for management of prepaid cards and recharge coupons. It allows the operator to create card files and print them offline. Support for plastic scratch card printing by a third party is also provided, keeping in mind the security and confidentiality of the generated vouchers. The operator can create, activate, block and delete any voucher through the system. Automatic archiving of vouchers/card numbers is done to ensure non-repeatability of the numbers.

The prepaid cards as well as the recharge coupons have their own Inventory Management Systems. Their entire life cycle is traceable through the Inventory Management System.

**Service Provisioning and Charging Management**

The C-DOT SMP provides the user interface to create, update and delete subscriber data and tariff tables at the SCP. It allows the operator to provision service(s) at the SCP and to configure, update or withdraw already running services. The local and remote operator terminals (SMAP) can access the SMP via dial-up, LAN or through the Internet. The Service Creation Environment Point (SCEP) is connected to the SCP via the SMP.

**Web Based Customer Profile Management**

Web based access is provided to subscribers for recharge management, transaction details and balance inquiries.

**Billing and Accounting Server**

For the third-party charged services, the bill is generated at the SMP. It also provides billing information for prepaid services. Along with the billing information, the SMP provides detailed call log analysis reports that describe the user and system behavior for a given time duration.
M-Commerce Transaction Interface
The SMP provides an interface to m-commerce transaction servers so that the prepaid cards can act as stored value accounts. Credit, debit and transfer transactions can be done by using them.

M-Commerce Transaction Interface
It provides the means to verify CDRs for newly provisioned services and subscribers. This enables online CDR monitoring for any service or subscriber under monitoring.

Revenue Sharing System
The revenue sharing system is used for settlement of interconnect charges between service providers. Interface is provided for laying down the revenue sharing formulae and generating payable/receivable reports. This module can also be used for generating revenue and reports on the basis of area code groups and IN services.

Fraud Management Services
The SMP provides a set of fraud control services, which detect illegal attempts to access services, irregular usage patterns and intrusion attempts.

Traffic Monitoring
Traffic monitoring capabilities are provided for system-wide services as well as for individual subscribers. As much as 10% of the entire subscriber base can be put under detailed traffic monitoring.

Transaction Logging
All operator activities are monitored and logged in a secure repository that can be viewed by the Administrator.

<table>
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<tr>
<th>Processor</th>
<th>Intel X86</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>Linux</td>
<td>Tru64 Unix</td>
</tr>
<tr>
<td>Speed</td>
<td>2.4 GHz</td>
<td>1.25 GHz</td>
</tr>
<tr>
<td>Memory</td>
<td>&gt;4 GB</td>
<td>Up to 2 TB</td>
</tr>
<tr>
<td>Storage</td>
<td>Up to 1.5 TB</td>
<td>Up to 2 TB</td>
</tr>
<tr>
<td>Database</td>
<td>Oracle RAC</td>
<td>Oracle RAC</td>
</tr>
<tr>
<td>Middleware</td>
<td>JBOSS</td>
<td>Up to 8 per node</td>
</tr>
<tr>
<td>No. of Remote &amp; Local Terminals</td>
<td>Any number</td>
<td>Any number</td>
</tr>
</tbody>
</table>

* SCP and SMP can be bundled together for an entry level solution.
The Service Creation Environment Point is a GUI based environment for quick realisation of new IN services. Service Independent Building Blocks (SIBs) can be stringed together to create Service Logic Programs (SLPs). The SLPs, after validation, are then uploaded to the SCP via the SMP. This ability to create and test service logic programs is central to the power of the IN framework.

User-friendly Java-based GUI

C-DOT SCEP, which is a Java based graphical SCE, enables operators to quickly react to competitive pressures. It facilitates rapid and efficient creation of innovative IN services that can be deployed into the market as and when required and with limited deployment risk.

It supports development, validation and testing of the service logic programs. The key deliverables are service logic executables and service data templates. Multiple users can create and modify services simultaneously.

Rich SIB Library

The power of the SCEP itself lies in the variety of SIBs it offers. The C-DOT SCEP offers all the ITU-T standard SIBs (INAP CS-1 & CS-2), CAP SIBs and WIN Phase 2 SIBs as well as custom SIBs. Additionally, there is the flexibility to create new SIBs as and when required.

Standard SIBs

Standard SIBs supported by the C-DOT SCEP include BCP, Log Call Info, User Interaction, Charge, Authenticate, Service Filter, Algorithm, Compare, Distribution, Screen, Service Data Management, Translate, Status Notification, Verify, Queue, Split, Join, Initiate Service Process, Message Handler, End, etc.

Additional SIBs

Additional SIBs provided by the C-DOT SCEP include String, Wait, Copy, Update Traffic Counter, Net Charge Determine, Case, Timer, Arithmetic, Trace and User Defined SIBs (Core SIBS, High Level SIBs).

Flexibility

The flexibility offered by the SCEP enables the service providers to modify the existing building blocks or design new ones to meet the demands of specific markets.

Key Benefits to Service Providers

- Platform-independent product for Unix, Linux and Windows platforms.
- Flexible and rapid creation of new services.
- User friendly GUI.
SERVICE CREATION FOR C-DOT SCEP
PERSONAL SERVICES

C-DOT IN solutions provide Personal Services that enable a service subscriber to be accessible at all times. The subscriber may define his service profile for preferential or conditional routing and is offered various other features to customize the treatment of incoming calls.

The following Personal Services are currently being offered:

- Universal Access Number
- Universal Personal Telecommunications

Universal Access Number (UAN)

The UAN service is an access code based service that enables the service subscriber to publish a unique number, and have the incoming calls routed to several terminating lines spread over a number of physical locations, depending on pre-defined routing "rules". These rules may be the time, day or date when the call is made (i.e. Time Dependent Routing) or the geographical location of the caller (i.e. Origin Dependent Routing).

The UAN service can be configured for two flavours viz local UAN (UAN-L) and Long Distance UAN (UAN-LD). In UAN-L, local calls within the home network of the UAN subscriber are permitted, whereas in UAN-LD, calls from anywhere in the national long distance network can terminate on the UAN subscriber.

Key Service Features
- One Number
- Call Distribution
- Call Forwarding Conditional
- Time Dependent Routing
- Origin Dependent Routing
- Originating Call Screening

Benefits to Users
- The subscriber needs to publish and advertise only a single number for nation-wide access
- No calls are missed. Very high call completion ratio as a result of powerful features

Universal Personal Telecommunications (UPT)

The UPT service enables access to telecommunication services to the roaming subscribers. It enables the subscriber to initiate and receive calls on the basis of a personal, network-transparent UPT number across multiple fixed and mobile networks, irrespective of the geographic location. The universal access is, therefore, limited only by the terminal's and network's capabilities and restrictions imposed by the network operator, if any.

The UPT subscriber can register any fixed or mobile terminal of any network for incoming calls. For the incoming calls, the calling party is charged maximum up to the Charging Reference Location (as specified in the subscription profile). Any excess charge, if applicable, is levied to the UPT subscriber.

Similarly, the UPT subscriber can register any fixed or mobile terminal of any network for outgoing calls. For the ongoing UPT calls, complete charge is levied to the UPT subscriber. The UPT subscriber can have multiple simultaneous outcall registrations up to a pre-specified maximum limit. Also, the subscriber has the flexibility to make outcalls without registering any terminal for outcall.

Key Service Features
- Authentication
- Follow Me Diversion
- Personal Numbering
- Split Charging
- InCall Registration
- Outgoing UPT Call
- InCall Delivery
- OutCall Registration
- AllCall Registration
- Originating User Prompter
- One Number
- Remote InCall Registration
- Time Dependent Routing
- Call Forwarding Conditional

Benefits to Users
- Allows personal mobility, whereby the user is not associated with any particular network access point
- Allows the user to be identified by a unique network transparent UPT number
- Allows the user to be charged and billed on the basis of UPT user identity rather than terminal or line identity
- Allows the user to have standard access and authentication procedures for UPT facilities across multiple networks
Prepaid calling cards offer many advantages to the service providers and, nowadays, are the preferred mode for service offering. For the individuals, therefore, it is a good way to keep their telephone bills within budgetary limits. C-DOT IN solutions offer a number of flavors of prepaid services for the wireline and wireless users. The user can use the same calling card from PSTN, Mobile, CDMA & IP networks, eliminating the need to carry different cards while using different networks. The service providers can use these to harness the opportunities for enhanced revenue from the popularity of the prepaid services.

C-DOT IN prepaid services portfolio contains basic use-and-throw calling cards as well as rechargeable "account" cards. The services are easily customizable with the help of features such as flexible account number length, maximum number of simultaneous calls from the same account, low threshold for credit indication and language selection.

The IN system comes with its own Voucher Management System and Inventory Management System for the creation and management of prepaid cards.

**Virtual Card Calling (VCC)**

The VCC service allows subscribers to make local and long distance calls and have the cost of the calls charged to the VCC number. This flavor of the service allows cards of various value denominations and corresponding calling privileges, such as, only national long distance calls allowed, national as well as international long distance calls allowed, etc. The validity of the calling card is governed by the expiry date and the balance money left on the card. The expiry date is set dynamically and identified from the date the first call is made on the card. A low balance indication is given to the user when a set threshold is reached.

**Account Card Calling (ACC)**

This is the "rechargeable" version of the VCC service. The PIN protected account can be recharged by using the recharge vouchers that are generated at the system through the Voucher Management System or through the m-commerce interfaces.

The service comes with a special Customer Profile Management number, which plays back the balance and the expiry date of the account, and offers the options for PIN change and account recharge.

**Prepaid for Wireless (PPW)**

This is the equivalent of ACC service for GSM and CDMA mobile users.

The user can recharge the PPW account using recharge vouchers in the home network as well as while roaming. The standard features of dynamic expiry, low balance alerts, promotional recharge coupons, recharge via the m-commerce interfaces are also available.
SERVICES FOR THE ENTERPRISE

For any service provider, the corporate customers contribute a major portion of the revenue from value added services. It is, therefore, critical to offer them continuous value through novel applications that are customizable to their needs.

C-DOT IN solutions offer a wide range of value added services for the corporate and enterprise customers. The service providers can embellish the services with features like Private Numbering Plan, Abbreviated Dialing, Call Completion to Busy and No Answer, Incoming/Outgoing Call Restrictions, Origin/Time Dependent Routing, Alternate Billing and Profile Management. These services are compliant to ETSI CS-1 INAP & 3GPP CAMEL Phase-2 standards and are available on a choice of platforms.

Tollfree (Freephone)
This service allows the users to make free calls to an easily remembered Tollfree number. All such calls are charged to the Tollfree subscriber. The calls can be completed in a variety of ways e.g. to a Voice Response System or attended and routed to one or more destinations according to the routing rules laid down by the service subscriber. It is a very popular business service for Customer Care Helplines, Hotel and Travel Booking, Food Delivery and social initiatives undertaken by governments. Features such as Origin Dependent Routing (ODR), Time Dependent Routing (TDR), Originating Call Screening (OCS) and Call Distribution can be used to add powerful call completion capabilities to the service.

The Access Code, e.g. 1-600, can be modified as per the service provider's numbering plan.

Virtual Private Network (VPN)
VPN is a very useful service for optimum and secure utilization of an organizations telephony resources. It allows the setting up of a Virtual PBX from public land mobile and fixed network resources. In addition to the basic features like Authorization Authentication, customized dialing and numbering plans, a wide range of features such as Closed User Group (CUG), Abbreviated Dialing, Off-net Access, Call Forwarding, Call Restrictions, Detailed Billing and TDR are available as per ETSI CS-1 and CS-2 standards.

Premium Rate (PRM)
PRM service enables subscribers to provide value added information based services to the users. The service provider allocates an easily remembered premium rate number to the service subscriber. The calls made to the premium rate number are charged at a higher rate than the normal calls. The revenue generated by the premium rate calls is shared between the service provider and the service subscriber. This service allows the subscriber having one or several terminations to be reached from all parts of the country or internationally, as appropriate, with a premium rate number. Apart from other standard features, it also supports Origination User Prompter (OUP) and Destination User Prompt (DUP) features. Some very popular premium services are astrology, medical and legal consultation, sports news and chat lines.

Televoting
Televoting is a very popular service for mass call-in programs and opinion polls. The callers call the advertised Televoting number/s to register their choice with or without manual interaction. The last few digits are the "choice digits". This service can be used by the mass media providers like television, radio, newspapers and magazines for commercial and social objectives.

M-Commerce Payment Gateway
This generic service enables the IN prepaid accounts like VCC, ACC and PPW to be used as debit cards for payments. The SCP is interfaced to the m-commerce transaction system for crediting, debiting and transferring money to the user's prepaid account. The prepaid card/account can be refilled via mobile phone, SMS and Internet. This capability opens up opportunities for anywhere payment of utility bills, store purchases and online purchases.
SERVICES FOR THE ENTERPRISE

C-DOT IN solutions offer enhanced IN services that leverage the power of the IP networks as well as the converged PSTN and IN networks. The Converged Services are aimed for personal users and service portals. The services include Internet Call Waiting and Click-to-Dial.

Internet Call Waiting (ICW)

ICW is the simplest way for a subscriber to receive and answer calls while his line is busy in a dial-up connection. ICW links the phone with the Internet so the user is notified of an incoming call, while he surfs and gives a variety of call handling options via a pop-up menu, for instance

- Take the call
- Transfer the call to another phone
- Play the caller a message
- Ignore the call

Benefits to Users

- The user is informed about the waiting call via a pop-up menu showing the name, number and location of the caller and call handling options
- Waiting calls can be answered without terminating the Web session
- Waiting calls can be answered selectively

Click-to-Dial (CTD)

CTD allows users to initiate telephone calls by clicking on a Web page icon or button. When an end user initiates a Click-to-Dial Web call, the server rings the called party and the user simultaneously. The server then bridges both the calls and the two parties can start speaking.

If the user dials a customer care then the server routes the call to the agent most likely to handle the user’s call. For example, if a caller clicks on the Web page of a fast-food joint, he will automatically be connected by phone to the neighborhood restaurant closest to his calling location.

Another implementation of the service can provide Web users with access to e-commerce and value-added information. They can initiate Click-to-Dial calls to complete e-commerce transactions at no extra charge (if the e-commerce site operator has elected to pay for the Click-to-Dial originated long-distance call or the call is routed to a toll-free call center).


**REGULATORY SERVICES**

C-DOT IN solutions offer Mobile Number Portability (MNP) and Fixed Number Portability (FNP) services to the service providers for meeting their regulatory obligations. These services are compliant to ETSI, INAP and 3GPP CAMEL Phase 2 standards and are available on a wide range of platforms.

Number Portability (NP) is the ability of the users of telecommunication services (both mobile as well as fixed line) to retain their existing telephone numbers when switching from one telecommunications carrier to another, without any impairment of quality and reliability. NP is a powerful tool for fostering competition among service providers and improving the overall quality of service.

C-DOT IN solutions have a Number Portability Administration Center (NPAC) for FNP and MNP for the Number Management. It enables clear and transparent procedure of number portability between the donor and recipient networks. For porting processes it provides an efficient and effective way to exchange porting information with respect to the existing privacy legislation.

C-DOT provides the NP solutions based on Query on Release (QoR) and Onward Routing (OR) methods.

**Query on Release (QoR)**

The Originating Network receives a call from the caller and routes the call to the Donor Network. The Donor Network releases the call and indicates that the dialed directory number has been ported out of that switch. The Originating Network sends a query for Number Portability. As a result of the query, the routing number associated with the dialed directory number is returned. The Originating Network uses the routing number to route the call to the Recipient Network. (Diagram overleaf)

**Onward Routing (OR)**

The Originating Network receives a call from the caller and routes the call to the Donor Network. The Donor Network detects that the dialed directory number has been ported out of the Donor switch and sends a query for Number Portability. As a result of the query, the routing number associated with the dialed directory number is returned. The Donor Network uses the routing number to route the call to the Recipient Network. (Diagram overleaf)

**Benefits to Service Providers**

- Clear and transparent procedure for Number Portability
- An efficient and effective Number Management to exchange porting information
- Less time to implement NP correctly
- Cost effective implementation of NP
- Centralized Number Portability Administration Center

**Benefits to Users**

- No effect on the call dialing procedures
- Flexibility to subscriber in choosing the operator of his choice, while retaining the existing number
- The mechanisms used have a minimal impact on the call performance
- Customers get access to services determined by the recipient operator, thereby minimizing the difference in services offered to the ported and non ported numbers within the recipient network
- Limited interruption of service. In case of MNP, the process of changing SIM card is very easy for the customer