Cable Telephony Platform Capabilities

Service Description

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Cable Telephony Platform Capabilities

Net2Phone’s hosted Cable Telephony Solution conforms to the CableLabs PacketCable standards and enables MSOs to offer competitively priced local and long distance telephony services to their subscribers.

The solution is comprised of the following components:

- **Planning & Deployment**
  - Network & Systems Engineering
  - Business Process Development
  - Billing and Provisioning Integration
  - Systems Customization and Deployment

- **Call Management Server (CMS) Platform**
  - Call Agent & Signaling
  - Announcement Server
  - Class 5 Feature Support
  - Trunking Gateways

- **Real Time Service Assurance Platform**
  - Network Management (alarms, remote administration, fault management and network element management)
  - Service Management (subscriber data management, Record Keeping Server and billing)
  - 24 x 7 Network Operation Center (Methods & Procedures, Tier 2 through 4 support, trouble ticketing and Service Level Agreement management)
  - Quality of Service (QoS) Metrics

- **Telecommunications Administration**
  - Infrastructure Management (Phone Number, Analog and IP Circuit provisioning)
  - Local and Long Distance Bi-lateral Termination Agreements
  - Emergency Support Services (E911, CALEA and Operator Assisted Services)
The Net2Phone solution is flexible in that it allows MSOs to incorporate existing MTA and CMTS equipment into the solution.

<table>
<thead>
<tr>
<th>Net2Phone Provides</th>
<th>MSO Receives</th>
<th>MSO Retail Offer</th>
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<tbody>
<tr>
<td>• Cable telephony business modeling</td>
<td>• Accelerated market penetration</td>
<td>• Universal local and long distance</td>
</tr>
<tr>
<td>• Integrated, tested and operational solution</td>
<td>• Immediate critical mass (economies of scale)</td>
<td>• Class 5 features and value added applications</td>
</tr>
<tr>
<td>• Customized OSS and network interfaces</td>
<td>• Network design and development capabilities</td>
<td>• Managed Quality of Service (QoS)</td>
</tr>
<tr>
<td>• Telecom methods and procedures</td>
<td>• Operational process integration</td>
<td>• Regulatory features</td>
</tr>
<tr>
<td>• 24 x 7 NOC</td>
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**Planning and Deployment**

Net2Phone works with each MSO to understand their specific cable telephony business and operational objectives and then helps to design an entire telephony solution that meets those requirements. Depending on existing business processes and systems, Net2phone customizes the solution to leverage the MSO's legacy systems and processes where applicable.

On the network and systems engineering side, Net2Phone engineers assess the MSO's existing and planned HFC plant and IP Backbone to architect the optimal telephony network that provides a fully managed quality of service. This exercise also involves projecting traffic size in order to develop a solution that can handle peak capacity demands and scale accordingly.

**Network and System Engineering**

Net2Phone's implementation team works with MSO engineers to design an optimal VoIP topology for the MSO that uses the MSO's HFC network and IP Backbone and connects to the PSTN. While each deployment will have unique design characteristics, the fundamental architecture is represented by the conceptual network and systems architecture displayed in Figure 1. The architecture consists of two self-contained segments engineered to optimize:

- Voice quality, network and systems availability
- System and economic scalability
- Local and long distance termination costs
The left side of the diagram represents the Net2Phone centrally located infrastructure consisting of two network segments:
1. VoIP gateway segment that interfaces to the PSTN.
2. Network Management Segment that contains the management systems, billing systems and the PacketCable-compliant Record Keeping Server.

The right side of the diagram represents the operator's head-end, voice-specific infrastructures consisting of three segments:
1. VoIP gateway segment that interfaces to the PSTN.
2. CMS (also known as soft switch) segment that performs all of the call control functions in a fully redundant configuration. By placing the soft switch within the operator's network, the service remains operational for subscribers should a failure of the links back to the Net2Phone segments occur.
3. MSO local access network segment that contains the CMTS and the MTAs.
Configuration Highlights

Some highlights of the configuration shown in Figure 1 include:

- **Multiple Data Links for Network Management**
  The service remains fully operational even in the event of primary link failures between Net2Phone and the operator. All off-net calls are directed to the local operator VoIP segment. Management data utilizes the back-up data link (VPN tunnel).
  
  - **Dedicated Point-to-Point Connectivity** will be established between the operator and Net2Phone as the primary signaling path for data (control and management functions) and may also be used for voice transport to and from the Net2Phone VoIP gateway segment.
  
  - **VPN Tunnel** will be established through the Internet as a back-up management link between Net2Phone and the operator. This link is only used for data (control and management functions) between Net2Phone and the operator in the event of point-to-point connectivity failure.

- **Traffic Prioritization**
  RTP and MGCP have priority within the network over management or other data packets.

- **Redundant Carriers and Redundant Equipment**
  - Should one facility from any carrier fail, a back-up facility exists from another carrier. In addition, actual facilities and loops are provisioned with redundancy to minimize single points of failure.
  
  - The CMS (softswitch) is deployed in a redundant configuration. The gateways implement highly reliable configurations. Separate gateways are used for each PRI or SS7 facility and can serve as a cold spare if needed.

- **In-band and Out-of-Band Remote Equipment Management**
  All systems are monitored using standard management protocols such as SNMP and can be managed remotely through the redundant data links.
Business Process Development

Net2Phone recognizes the impact that implementing and supporting Voice Services will have on the current MSO business processes. To that end, Net2Phone provides the MSO with the tools and training needed to not only launch and support Voice, but to successfully integrate new voice business processes into existing MSO business processes as well. To accomplish smooth process assimilation, Net2Phone has developed and documented the following business processes and for which Net2Phone will provide training and support during the MSO Voice Service launch:

- Voice Subscriber Provisioning Process
- Back-end Billing System Processes (interfaces between: Net2Phone and MSO; Net2Phone and local banks; Net2phone and MSO-selected third party vendors)
- Back-of-House Billing Business Processes (credits, payments adjustments, manager approval processes)
- Service Activation and Deactivation Processes
- Telecom Support Methods and Procedures for Customer Service Reps
- Network Operations Escalation Procedures (change management and emergency outage procedures)

Systems Customization and Deployment

A key operating principle of the Net2Phone solution recognizes that the MSO must leverage its existing assets and capabilities in order to roll out a successful telephony effort. Net2Phone is prepared to customize the solution to conform with the legacy systems and processes of the MSO. Whether it is the activation and provisioning system or the existing billing systems, the MSO requires the flexibility to coordinate a truck roll for activating high speed data and voice as well as the ability to integrate the two services into one customer invoice.

Another critical advantage is Net2Phone’s network management tools that blend with existing Network Operations tools. This powerful combination provides an end-to-end view of the voice and data network.

Call Management Server (CMS) Platform

The CMS Platform is engineered to scale both up and down, both technically and economically. The resulting architecture is significantly more cost effective than Constant Bit Rate (CBR) solutions. Net2Phone’s solution provides great flexibility in the deployment and distribution of off-the-shelf third party components as well as those components which are unique to Net2Phone. Specifically, the software that routes the calls is placed locally in the MSO’s head-end while the expensive, complex back-office systems reside in the Net2Phone network. The corresponding solution eliminates the need for costly CLASS 5 switches and equipment and allows for the back-office systems to be leveraged among multiple MSOs.
The fully-managed Quality of Service (QoS) solution delivers a “local quality” telephone service resulting in maximized customer satisfaction and reduced churn. The CMS Platform supports CLASS 5 competitive features, applications and regulatory features in a phased deployment. The end-to-end solution has been developed to be DOCSIS 1.1 compliant.

Figure 2 – Net2Phone’s PacketCable™ Overlay

Net2Phone has evaluated, integrated and tested each of the network components in order to provide the MSO with guaranteed levels of Quality of Service (QoS). Net2Phone’s hosted telephony solution removes some of the network troubleshooting from the MSO’s responsibilities as the result of the ongoing management and service assurance that are critical components of the Net2Phone solution.
The “glue” to this solution are the Net2Phone-developed Real Time Service Assurance Platform and Record Keeping Server (RKS). The platform enables the MSO to proactively monitor real time views of each network component to identify, diagnose and remedy any problems before callers are aware that any network problem exists. The RKS collects the subscriber usage data as key inputs for customer support and billing systems.

Table 1 – Functional Network Components Description

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
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<tbody>
<tr>
<td>Multimedia Terminal Adapter (MTA)</td>
<td>A client device that contains a subscriber-side interface to the subscriber’s phone and a network-side signaling interface to call control elements in the network.</td>
</tr>
<tr>
<td>Cable Modem Termination System (CMTS)</td>
<td>Provides data connectivity to the MTAs over the HFC access network.</td>
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<tr>
<td>Call Management Server (soft switch)</td>
<td>Provides call control and signaling related services for the MTA, CMTS and PSTN gateways in the PacketCable network.</td>
</tr>
<tr>
<td>Media Gateway</td>
<td>Provides bearer connectivity between the PSTN and the IP network.</td>
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<tr>
<td>Record Keeping Server (RKS)</td>
<td>Receives PacketCable Event Messages from other network elements and assembles the messages into Call Detail Records.</td>
</tr>
<tr>
<td>Billing System</td>
<td>Receives CDRe from the RKS for invoicing and customer service functions.</td>
</tr>
<tr>
<td>Announcement Server</td>
<td>Manages and plays information tones and messages in response to events that occur in the network.</td>
</tr>
<tr>
<td>Real Time Service Assurance Platform (CVOSS, Dashboard and Portal)</td>
<td>Service assurance and network management platform that collects real-time call information from the cable access network, Record Keeping Server and VoIP gateways. Complemented with a broad range of independent PSTN tests, extensive data correlation, alarming and reporting capabilities.</td>
</tr>
<tr>
<td>Syslog</td>
<td>Collects events such as transmissions and errors from an MTA.</td>
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Traditional PSTN Subscriber Features

Net2Phone's solution will enable MSOs to offer the same competitive features as traditional telephony providers. Subscribers activate the features by dialing the same combination of numbers as supported by traditional service providers.

CLASS 5 Feature Support

The Cable Telephony solution supports basic CLASS features such as:

Table 2 – Support CLASS Features

<table>
<thead>
<tr>
<th>CLASS Feature List</th>
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<tbody>
<tr>
<td>• Calling Number Delivery</td>
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<tr>
<td>• Calling Number Delivery on Call Waiting</td>
</tr>
<tr>
<td>• Cancel Call Waiting</td>
</tr>
<tr>
<td>• Automatic Recall using TCAP</td>
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<tr>
<td>• Call Forwarding</td>
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<tr>
<td>• Selective Call Rejection</td>
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<tr>
<td>• Three-Way Calling</td>
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<tr>
<td>• Distinctive Ringing on Call Waiting</td>
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<td>• Speed Calling</td>
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<tbody>
<tr>
<td>• Calling Name Delivery</td>
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<tr>
<td>• Calling Name Delivery on Call Waiting</td>
</tr>
<tr>
<td>• Call Forwarding Busy Line</td>
</tr>
<tr>
<td>• Automatic Callback using TCAP</td>
</tr>
<tr>
<td>• Selective Call Acceptance</td>
</tr>
<tr>
<td>• Do Not Disturb (DND)</td>
</tr>
<tr>
<td>• Distinctive Ringing</td>
</tr>
<tr>
<td>• Residence Distinctive Ringing</td>
</tr>
<tr>
<td>• Call Waiting</td>
</tr>
<tr>
<td>• Calling Identity Delivery Blocking</td>
</tr>
<tr>
<td>• Consultation Call Hold</td>
</tr>
<tr>
<td>• Call Forwarding Don’t Answer</td>
</tr>
<tr>
<td>• Selective Call Forwarding</td>
</tr>
<tr>
<td>• Anonymous Call Rejection</td>
</tr>
<tr>
<td>• Code Restriction</td>
</tr>
<tr>
<td>• Toll Restriction</td>
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</tbody>
</table>

Enhanced Features

In addition to the basic CLASS features, the solution will support the following enhanced subscriber features:

• Voice Dialing
• Voice Mail
• Conference Calling

In addition to these enhanced voice services, VoIP serves as a bridge to future applications such as voice dialing. IP is inherently more efficient than Constant Bit Rate (CBR) in that it does not require a dedicated circuit or bandwidth for each transaction. VoIP leverages the existing MSO infrastructure and therefore minimizes additional costs associated with offering voice services.
Emergency Support Features

The Cable Telephony Solution will provide features that are mandated by government regulations such as:

- 911/PSAP (Public Safety Answering Point)
- Call Trace and Call Interrupt
- CALEA (Wire Tap)
- Local Number Portability (LNP)

411, 611 and Other Application Support

Subscribers may dial any on-net to on-net customer as well as to a PSTN number. In addition, the solution supports 800, 611 and 411 outbound calls.

Real Time Service Assurance Platform

What sets Net2Phone's Cable Telephony Platform apart from other vendors is CVOSS (Cable Voice Operation Support System) – Net2Phone's real time network and service management suite. CVOSS is a fully automated, end-to-end management suite that incorporates monitoring, diagnosis and troubleshooting elements across the local cable HFC network, Net2Phone's global IP network and the PSTN. The sophisticated CVOSS monitoring system enables the MSO to proactively monitor real-time views of each network segment to identify, diagnose and resolve the root cause of problems before callers become aware of them. CVOSS bridges the gap between packet metrics and traditional telephony metrics providing the MSO with a call-level view of the VoIP service.

The MSO administers and controls the functionality of the management suite via the CVOSS Portal and the CVOSS Dashboard GUI.

CVOSS Portal

The CVOSS portal is a web-based application that acts as a single interface for:

- **Subscriber Management** – at the core of the CVOSS Portal resides a transaction manager responsible for collecting subscriber data from the billing and provisioning systems and mediating that data across the various network elements.
- **Reporting and Data Mining** – the data mining functionality provides the MSO with historical reports useful in analyzing telephony date and identifying clustering of failures. These reports can be automated across any combination of telephony metrics (Answer Seizure Ratio, End of Call Reason, etc.) and sources (CMTS, Carrier, Country Code, etc.).
• **Documentation** – allows support personnel to view regularly updated documentation and access an online help system (FAQs) that allow users to save information “bytes” based on their individual needs. Document examples include escalation procedures, engineering data, etc.

Figure 3 – CV OSS Portal
CVOSS Dashboard

The CVOSS Dashboard is a PC client application that provides:

- **Alarms/Faults** – generated from thresholds established by the MSO through the Data Mining functionality, the real-time alarms can be established across the same telephony metrics and sources as Reporting. Technicians can link directly to an alarm description and the detailed Methods & Procedures.

- **Real-Time Activity** – technician displays with easy-to-interpret using call state and call detail information including Call Setup, Call Disconnect & Connect and End of Call Reason. The GUI links to live Group and Span Status screens to show usage and status detail at the individual call level.

**Figure 4 – Dashboard**

24 x 7 Network Operation Center

Net2Phone currently operates a Network Operations Center (NOC) that has a combined expertise in both Voice and Data. The center provides a 24 x 7 support system to Net2Phone’s worldwide operations. Network management tools are used to monitor and manage call quality and view all gateway traffic on a real-time basis. In addition to network monitoring and management, the NOC isolates and troubleshoots individual network components that comprise the solution.
QoS Metrics

The solution’s Quality of Service metrics guarantee MSOs that voice quality and service availability meet or exceed customer expectations.

Table 3 captures the solution’s QoS metrics for U.S. Domestic calls for both Primary and Secondary lines.

### Table 3 – Captured & Assessed Standard QoS Metrics

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<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dial Tone Delay</td>
<td>Usage (total calls, total minutes)</td>
<td>Upstream Signal Quality</td>
<td>Distribution by Billing Plan</td>
<td>Destination Distribution (local, regional, long distance, and international)</td>
</tr>
<tr>
<td>Post Dial Delay</td>
<td>Call Success Ration</td>
<td>Upstream and Downstream Power Levels</td>
<td>Distribution by Location</td>
<td>Distribution by Time of Day</td>
</tr>
<tr>
<td>MOS Score (PESQ)</td>
<td>Answer Seizure Ratio (ASR)</td>
<td>Packet Loss</td>
<td>Distribution by Status</td>
<td>Distribution by Day of Week</td>
</tr>
<tr>
<td>Routing Termination</td>
<td>Average Length of Call (ALOC)</td>
<td>CMTS Interface Statistics (bps)</td>
<td></td>
<td>Unsuccessful Calls</td>
</tr>
<tr>
<td>Categorization of Failed Calls (16 categories)</td>
<td>CMTS uncorrectables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simultaneous Calls</td>
<td></td>
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</table>

Voice Quality

Net2Phone incorporates the Perceptual Evaluation of Speech Quality (PESQ) to measure voice quality in its network management suit of tools. The output of the PESQ algorithm is the MOS rating that would be provided by a human. It is the most current and reliable predictor of voice quality.

Telecommunications Administration

Net2Phone leverages its telecommunication experience and expertise as a pioneer and leader in VoIP communications to manage all the carrier components of the solution including circuit provisioning, local and long distance termination and the acquisition and management of phone numbers as well as the ongoing management of these components.
An MSO starting down the road to offering telephony services faces an array of challenges in dealing with the carrier side of the business. Some of those challenges include:

- **Circuit Provisioning**
  Ordering, setting up and provisioning circuits and the ongoing administration of those circuits. This complicated process is one in which Net2Phone has proven its expertise over the years of operating its telephony services with leading carriers around the world. Part of this expertise includes the ability and insight to support, troubleshoot and resolve problems while working hand-in-hand with the appropriate staff of each carrier partner. Additionally, the setup and configuration of equipment (such as media gateways that connect networks to PSTN circuits) is a core competency of Net2Phone.

- **Call Termination**
  Net2Phone has built and operates a worldwide network with call termination for local and long distance calls and has developed the critical experience in the associated technologies as well as the financial aspects of communications administration. This expertise and set of relationships can be leveraged by an MSO to achieve optimal routing of phone calls from both a quality and economic perspective. Importantly, Net2Phone has years of experience in the settlement of accounts with carriers - a process that minimizes the need for an MSO to review what is often voluminous amounts of data.

- **Phone Number Assignment**
  Another key component of telephony administration is the acquisition and management of telephone numbers. An MSO wishing to offer telephony services needs to acquire a pool of phone numbers for each geographic region where telephony services are rolled out. The MSO is also responsible for the management of those phone numbers. For years, Net2Phone has successfully handled the administration of phone numbers for its consumer and enterprise customers.

- **Local Number Portability (LNP)**
  In order to effectively compete with the incumbent phone companies, MSOs must have the ability to accept a new subscriber's existing phone number. This requirement, known as Local Number Portability (LNP) becomes a key differentiator in enabling subscribers to convert from their existing service provider to the MSO's telephony service.

- **Additional Telephony Components**
  A complete telephony solution also requires interconnection with the existing PSTN and its signaling system. The U.S. version, SS7 and the C7 variations outside the U.S. all require an understanding of traditional signaling and familiarity with the specific country standards. Although a potentially complex process, having Net2Phone as a telephony partner assures the MSO a smooth telephony deployment.
Success in telephony requires a team well-versed in the creation and ongoing maintenance of technical, regulatory and business relationships with carriers - exactly those areas in which Net2Phone excels - enabling its customers to route billions of calls over the past seven years.

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