AVAYA

IP Telephony
Contact Centers
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WHITE PAPER

Migrating to Converged Networks and IP Telephony Applications:

Implications for Management Tools and Managed Services

May 2005

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Introduction

As widely chronicled by the industry press and analysts, the world of enterprise telephony is in the midst of a paradigm shift. Telephony technology is migrating from a dedicated and somewhat closed (proprietary) system and network environment to the more open environment of a converged IP network model. Telephony, within this new model, runs as an IP network application and must operate on, and interoperate with, the IP infrastructure and the management environment for the IP network.

While the implications for the design and architecture of the new converged networking and applications model have been at the forefront of industry literature, the transformation has important implications for maintenance and management components as well. For example, the move to an open converged network mandates securely monitoring and managing the network's voice applications as well as its data networking infrastructure elements.

For effective enterprise communications, it is essential to address the challenges of operating and managing complex multiple layers and the smooth interoperation of those layers. Requirements for performance management of the network and converged applications are shifting from a break/fix model that had been optimized at a single layer of the model. The new requirement for real-time performance management is to deliver the high reliability (i.e., 99.999% reliability) that has been available in the older voice networking environment. To meet this requirement, new approaches, tools and systems are needed

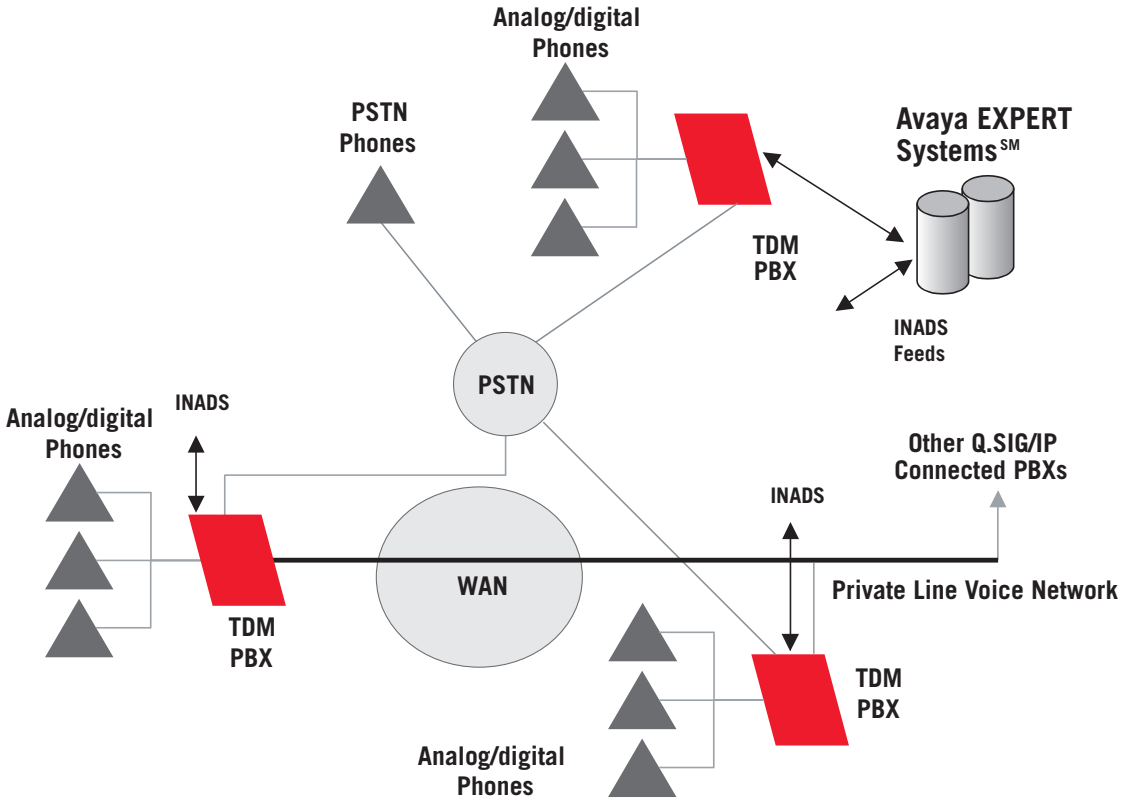
This paper addresses the need to integrate and coordinate the management of IP networking with the management of IP Telephony applications, and it describes how Avaya, the leading enterprise industry supplier of Intelligent Communications, is delivering solutions to address this pressing migration challenge.

IP Migration Implications for IP Telephony Application Design, Architecture and Management

In order to fully understand the implications of IP Telephony migration, it is necessary to understand the key elements of the dominant model that it is replacing. Avaya, as the leading supplier of time division multiplexing (TDM) PBX systems, had carefully honed this model during the rise of the modern digital PBX. It had built layers of systems and software reliability into its DEFINITY® PBXs. In addition, Avaya had achieved industry leading operational performance of its customer-installed DEFINITY systems, through a combination of service elements. These included:

- Remote monitoring architecture that was based on DEFINITY capability to alert Avaya about detected faults that might be service impacting
- Periodic diagnostic routines initiated both by the PBX and the Avaya remote service systems that search for conditions that might lead to future faults
- Avaya EXPERT Systems℠ Diagnostic Tools that not only rapidly diagnosed fault cause, but could take automated actions to correct faults remotely and/or dispatch technicians required for on-site repairs.

Illustration 1 lays out a simplified version of typical enterprise architecture and of the Avaya TDM network architecture with remote management. The INADS connections to the PBXs and Avaya EXPERT Systems constituted the communication vehicle for health checks and fault alarming.



TDM PBX Model

Figure 1: Time Division Multiplexing Network Architecture

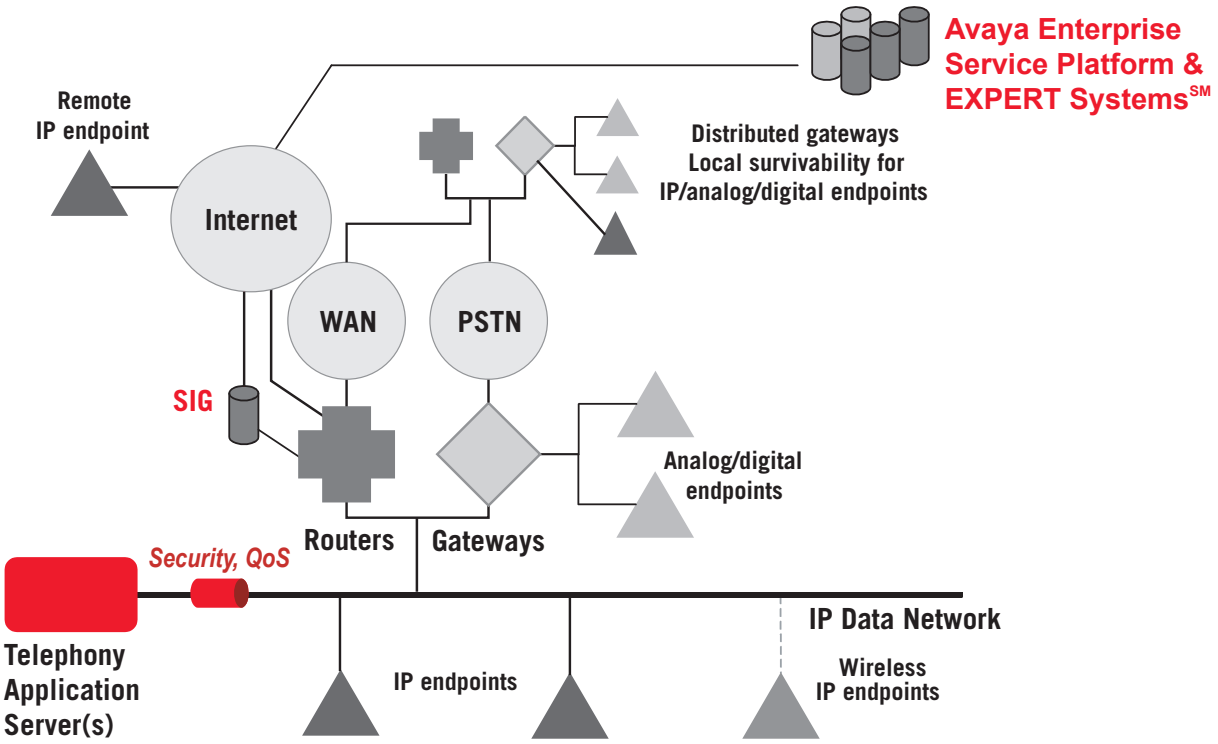
Avaya EXPERT Systems was developed as a platform to enhance Avaya maintenance services for Avaya telephony applications. EXPERT Systems was initially built as a responsive platform to system alarms. If an Avaya TDM PBX experienced a major alarm, the PBX would dial in to the Avaya remote monitoring systems. EXPERT Systems would then diagnose and automatically fix the fault where possible. When automated fixes were not available, EXPERT Systems would send alerts to service technicians. The platform was extended to periodically deeply analyze the specific PBX's functions and the performance of telephony applications, such as voice messaging, to achieve a more proactive means of avoiding catastrophic maintenance.

Using a combination of Avaya EXPERT Systems, intervention, and resolution by remote technicians and engineers, Avaya currently remotely resolves 96% of alarms involving Avaya applications, while the remaining 4% of alarms are resolved through on-site technician activity. Avaya Labs recently published a white paper analyzing the effects of remote monitoring on outage events. After analyzing data from more than 450,000 trouble tickets on 68,000 systems, Avaya Labs found that systems that experienced a major problem had approximately 65% fewer outages if they were monitored by EXPERT Systems.[1] EXPERT Systems resolves Avaya telephony application incidents quickly and prevents major outages.

Avaya has recently created additional value for its Avaya Maintenance Agreement customers with the delivery of EXPERT View[SM] Reports. These reports demonstrate the value of EXPERT Systems in minimizing potential system downtime and the associated costs that would accrue without the proactive monitoring capabilities.

Avaya has achieved exceptional voice communication application availability through EXPERT Systems. The challenge for Avaya, as it created new solutions for the migration to IP Telephony, was to achieve similar results in that new environment. This was no mean feat given the fundamental changes in the architecture and environments of converged IP networks.

As Avaya migrates its telephony systems to an IP Telephony architectural model, the applications architecture, network model, and interaction dependency with an integrated network have changed. Illustration 2, which lays out the new converged network model, can help illustrate some of the changes.



IP Telephony Model

Figure 2 IP Telephony Model

The first step in the Avaya application migration was to port EXPERT Systems to be able to manage its new Communication Manager software and MultiVantage™ Communications Applications. It chose this model rather than simply relying on the existing monitoring and diagnostic tools available in the data networking world.

General practice for monitoring and managing existing open systems uses the functions of element data collection (alarms, SNMP data, log data, etc.), aggregation of that data, and remote diagnostics to achieve fault resolution with parts replacements, software patches and/or configuration changes. None of these data environment management systems can match the capability of EXPERT Systems to resolve the majority of events and faults without human intervention to keep Avaya PBX and voice applications highly available.

Yet EXPERT Systems were designed specifically for Avaya telephony infrastructure products. With the Avaya migration to the IP Telephony world, a re-architecting of its remote monitoring and diagnostic approach was required. Avaya migrated from a highly controlled proprietary hardware and firmware platform to the world of open-systems multi-vendor hardware and networking infrastructure, open standards operating systems and

modular software. The IP world is heterogeneous in architecture, platforms, vendors and applications. For IP telephony applications to be effectively managed, visibility and penetration had to extend well beyond the IP based PBX. Converged management must address the multiple layers of the corporate communications model to ensure that each layer of the model is functioning and interacting with the other layers appropriately.

The challenge for the new Avaya management model was to ensure that each layer can:

- Perform effectively through real time monitoring
- Diagnose the root causes of application faults
- Initiate effective remediation actions for root cause issues
- Keep the customer updated on fault discovery, isolation and resolution
- Enable shared accountability models that can be tailored to specific customer needs

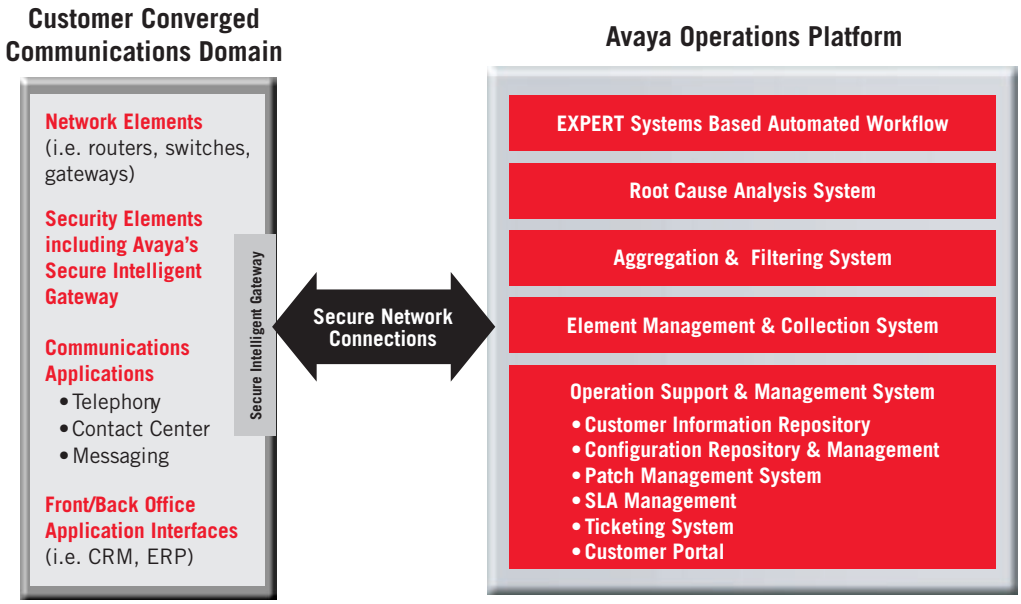
Building Upon and Moving Beyond Avaya EXPERT Systems

Avaya, recognizing the transformational need for a new management approach within converged IP environments, has re-architected its management platform to include a number of key design criteria. These include:

- A holistic approach to the entire environment
- Interaction and shared accountability with disparate systems and their vendors' support structure
- Scalable and distributed architecture
- Security protections for sensitive systems and data
- Optional levels for Avaya management to accommodate varying customer requirements for internal management.

Its layered approach permits this level of definable interaction of management tasks.

The Avaya Enterprise Service Platform addresses the entire enterprise communications model, in a multi-layered and multi-vendor approach. This new platform has been designed initially to support those Avaya customers that are selecting Avaya for IP telephony applications solutions. However, in almost every instance those same customers also have significant content from other vendors, especially in the routed/switched network domain and applications domain. Many Avaya customers also have a mixed vendor voice infrastructure. The new Avaya Enterprise Service Platform is designed to address both multi-vendor infrastructure and third party IP communications applications. The platform has the full facilities of element data collection, aggregation and filtering, correlation, and automated root-cause analysis.



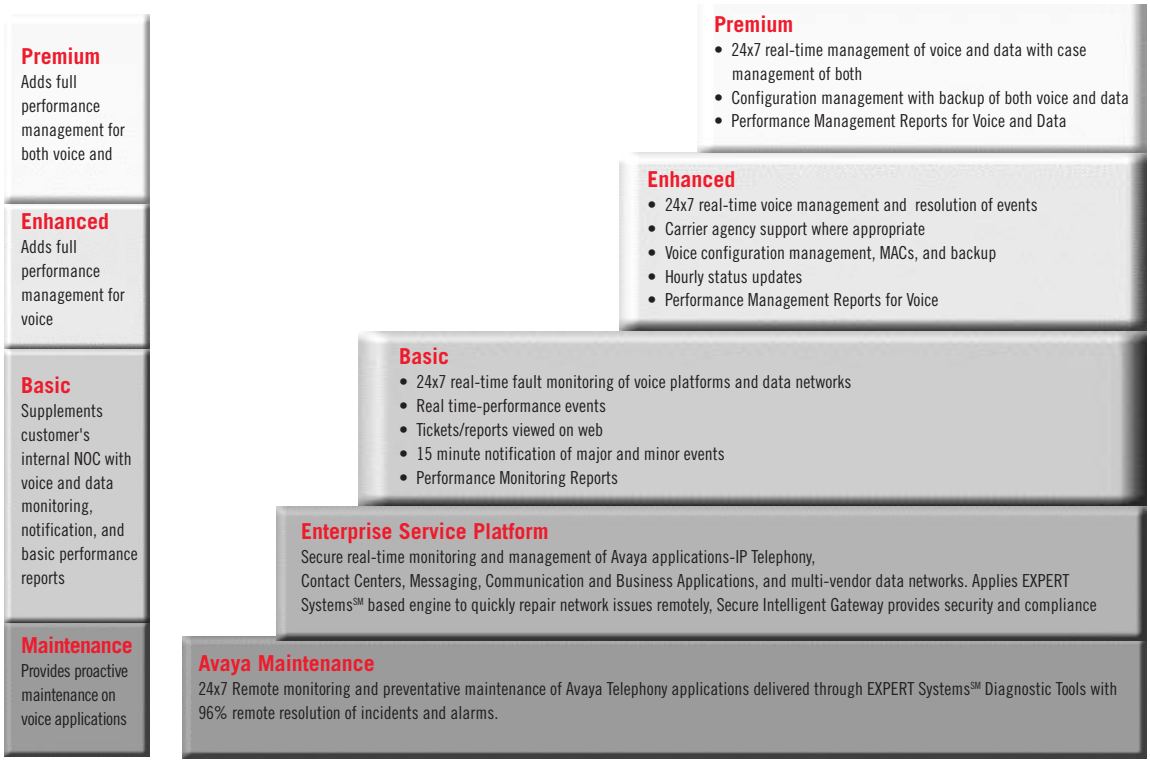
Avaya's Enterprise Service Platform

Figure 3 The Avaya Enterprise Service Platform

The EXPERT Systems prescription engine and automated workflow engine have been conceptually replicated for use in the Enterprise Service Platform. The platform's expert system is capable of targeting the full Open System Interconnection (OSI) layered model, including multi-vendor platforms and applications. Additionally, all of the knowledge based contained in the original EXPERT Systems is available to the platform expert system as well.

To address the need for both on site and remote management capabilities, Avaya has based its new platform on a scalable distributed architecture. The Avaya Secure Intelligent Gateway appliance component of the Enterprise Service Platform is typically deployed directly on the customer premise. This approach supports a range of options for defining shared accountability with specific customers and enables enhanced protection of sensitive customer data by isolating it behind the customer's firewall.

Avaya has chosen to deliver the value of the new management platform through a Managed Services approach. Avaya has created an initial series of service options for its Remote Managed Services for IP Telephony. In the illustration below, the key feature functionality associated with its Basic, Enhanced and Premium service levels are detailed with a progression that starts with voice and data fault and performance monitoring, adds full voice performance management, and finally adds full performance management for converged voice and data.



Avaya Remote Managed Services for IP Telephony

Figure 4 Avaya Remote Managed Services for IP Telephony

Each level of service is based on the capabilities of Avaya EXPERT Systems and the new Enterprise Service Platform. Should faults/outages of Avaya platforms require Avaya service technician response, the existing Avaya EXPERT Systems is used for break-fix analysis and remediation workflow. For coverage of IP networking infrastructure, the new expert system within the Enterprise Service Platform will successfully intervene in the overwhelming majority of software based faults and will isolate to the component/element/interface level for hardware faults. Requirements for dispatch on non-Avaya products/platforms will be sent to third parties identified in the shared accountability model established with each customer for break-fix dispatches, including the direct customer actions on those network components. The Avaya notification process will be based on the root cause and proposed remediation prescriptions derived from Enterprise Service Platform outputs.

Hybrid environments that include TDM and IP Telephony systems may see both EXPERT Systems and the Enterprise Service Platform applied. Data consolidation and normalization have already been accomplished in e-bonding between the two systems, leveraging the capabilities for both environments.

Defining the Benefits of the Avaya Enterprise Service Platform for its Remote Managed Services for IP Telephony

As we have seen from the architectural descriptions of the Enterprise Service Platform in the earlier sections of this paper, Avaya has taken a significant step forward in creating a holistic approach to the multi-layered and multi-vendor communications environment. This holistic approach enables Avaya to move its capabilities well beyond the limitations of closed system monitoring with its focus on break/fix maintenance. Avaya has opened the way to deliver real-time proactive systems management that includes fault and performance management for the various layers of the IP network and application model.

With the move to the Enterprise Service Platform, Avaya has not abandoned the capabilities of its industry leading EXPERT Systems Diagnostic Tools, but rather has built a new extended expert system that leverages the same concepts into the multiple layers of IP networking. This new expert system provides the logic and knowledge base that permits Avaya to achieve complex/multi-layered root cause analysis, remedial prescriptions, automated workflow execution, and ongoing and easily accessible customer reporting through Web notification and portal access.

Recognizing the breadth required to achieve effective fault and performance management across the entire IP communication domain, Avaya has engineered its Enterprise Service Platform with a number of key characteristics in mind. These include:

1. **Distributed** — to permit the platform to be worked both by Avaya and customers. This shared accountability approach enables cooperative interaction with both customer technical teams and other vendor/service provider technical support groups to identify and correct root causes of network and telephony application problems.

2. **Scalable** — to permit Avaya and customers to deal with extended global networks without bottlenecks

3. **Secure** — to protect sensitive customer data and restrict access to components of the network to those with authorization

4. **Customer accessible** — to enable customers' technical support personnel easy access to real-time status on the state and performance of their IP networks and applications

5. **Efficient** — to achieve effective IP Telephony performance management at reasonable support costs that are less than the costs to each customer building and operating their own performance management environments

6. **Open** — to achieve effective optimization of speed in handoffs and follow through on problems within a multi-vendor and service provider environment

Avaya recently announced Remote Managed Services for IP Telephony. Based upon the capabilities of its industry leading Enterprise Service Platform, the new services offer customers that are migrating to IP telephony and applications an exceptional value not available elsewhere in the marketplace.

Conclusions

The migration to converged enterprise IP networks and IP telephony has created new requirements for monitoring and maintaining networks and applications, and for addressing the need to monitor and manage the entire IP communication domain. The desired Five 9s of reliability that were possible in the previous generation of TDM PBX environments can be achieved in the new world of IP Telephony — but only with the right planning and management attention. That planning requires addressing the overall performance of IP telephony applications through a proactive real-time monitoring and performance management approach that has only recently been made possible with the newly announced Avaya Enterprise Service Platform, that are available with Avaya Remote Managed Services for IP Telephony.

As Avaya customers transition from traditional TDM to IP telephony and deploy advanced communication solutions such as contact center and unified communications, they should consider exploring a Managed Services solution. Avaya Remote Managed Services for IP Telephony, supported by the innovative Enterprise

Service Platform can assist customers in migrating to the new world of IP telephony. By lowering the risks associated with the migration to IP telephony, and using the most sophisticated real-time monitoring and management of applications and infrastructure, enterprises and their IT support staffs can help ensure that they are receiving the full mission-critical benefits of converged applications.

For more information on the Avaya Remote Managed Services for IP Telephony systems, applications and professional services, contact your Avaya Client Executive or Authorized Avaya BusinessPartner, or visit us at www.avaya.com

Footnotes

1. "Avaya Global Services: Quantifying the Value of Remote Maintenance" White Paper
   http://www.avaya.com/master-usa/en-us/resource/assets/whitepapers/svc2352.pdf

About Avaya

Avaya enables businesses to achieve superior results by designing, building and managing their communications infrastructure and solutions. For over one million businesses worldwide, including more than 90 percent of the FORTUNE 500®, Avaya's embedded solutions help businesses enhance value, improve productivity and create competitive advantage by allowing people to be more productive and create more intelligent processes that satisfy customers.

For businesses large and small, Avaya is a world leader in secure, reliable IP telephony systems, communications applications and full life-cycle services. Driving the convergence of embedded voice and data communications with business applications, Avaya is distinguished by its combination of comprehensive, world-class products and services. Avaya helps customers across the globe leverage existing and new networks to achieve superior business results.

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