Patton-BroadSoft Auto-Provisioning Solution for SIP Trunks Serving Customer-Chosen IP PBX

Split configuration domain on enterprise SBC enables touchless turn-up of SIP trunks with remote management all the way to the customer premise

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Introduction: The Problem of Profitability

For carrier-providers in today's multi-vendor, IP-centric communications landscape, the age-old challenge of achieving profitability comes with a new twist: Telecom operators must continuously offer new, faster IP-based services to replace their subscribers' outmoded TDM connections while leveraging new Unified Communications (UC) technology to entice new business customers.

When provisioning SIP-trunking services, a key challenge for the provider is the cost and complexity of ensuring interoperability with the customer-selected IP PBX or UC platform. The current business-communications market is crowded. Myriad vendors offer countless software and hardware options for small-to-medium business customers to choose from. In terms of effort and cost, testing and troubleshooting the vast number of possible CPE choices is a daunting prospect. For carrier-providers, tackling such a time-consuming task erodes service profitability.

Patton has partnered with BroadSoft to address this crucial challenge. Working in collaboration with BroadSoft, Patton has created an integrated, touchless automated-provisioning solution for Swisscom, a national incumbent carrier in Europe. The solution enables Swisscom to provision each SIP-trunk subscriber remotely (avoiding the dreaded costly truck roll), while ensuring interoperability with just about any IP PBX or unified communications platform on the market.

By integrating BroadSoft's cloud-based BroadWorks SIP service and Device Management (DM) with Patton's SmartNode Enterprise Session Border Router (ESBR) installed as customer-premise equipment (CPE), the Patton-BroadSoft automated-provisioning solution addresses a number of key challenges for service providers, while delivering the following benefits:

- Competitive advantage in subscriber acquisition: customers can keep and use their chosen IP-PBX or UC system

- Cost-savings: streamlined service provisioning and subscriber turn-up with no truck roll

- Ensured interoperability of network elements from multiple vendors. These elements may include softswitch, core/edge session border controllers (SBC), customer-premise SBC, PBX, phones, faxes, and so on…

- Ensured service quality

- Simplified CPE management

- Clearly defined SIP service demarcation point

- Secure separation between carrier WAN and customer LAN

By enabling the carrier-provider to manage, control, and troubleshoot the BroadSoft SIP trunk all the way to the CPE (service demarcation point), this solution eliminates risks and finger pointing, reduces debugging time, improves customer satisfaction and reduces churn—thus increasing higher average revenue per user (ARPU) and profits.

Solution Overview

From the cloud, BroadSoft provides the BroadWorks VoIP applications platform to Swisscom (the carrier). A carrier-class edge SIP session border controller (SBC) provides SIP-to-SIP normalization at the shared network edge. Swisscom delivers VoIP service–along with WAN access—to the enterprise subscriber over a fiber-optic trunk (or any other broadband technology). The Swisscom network terminates on the subscriber premise within the Patton SmartNode 5300 Enterprise Session Border Router (ESBR)—or another SmartNode ESBR model)—

which provides the LAN connection to the customer-selected IP-PBX, as shown in the figure below.

ESBR up and running by simply launching the Wizard and entering the customer credentials.

On-Premise Systems

IP PBX
Ethernet
SmartNode ESBR
SIP Trunk
G.SHDSL, EFM, Fiber or X.21
BroadWorks
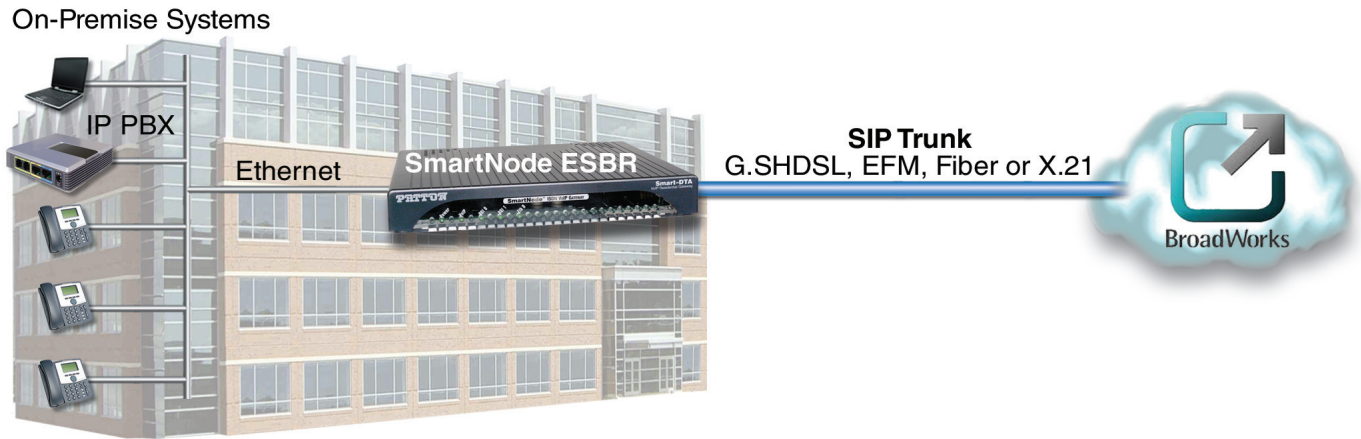
Deployed as customer-premise equipment (CPE), the Patton SN5300 is a business-class Session Border Controller (SBC) that provides a number of key functions, which **mutually benefit** the carrier and subscriber:

- Interoperability with the customer-selected IP PBX

- Touchless, automated provisioning of SIP trunking service via BroadWorks DM

- Remote management of Patton CPE via BroadWorks DM

- Secure WAN-LAN separation

- Secure, clearly defined SIP service demarcation

- SIP normalization between subscriber and provider network elements

- QoS traffic-shaping for assured voice quality and WAN optimization

- Testing and protocol analysis point on the subscriber premises

- SmartNode split configuration domain defines and separates carrier-managed from customer-managed parameters

- Patton's SmartNode Trinity WEB Wizard allows the Swisscom installation partner or subscriber's IT staff to quickly and easily get the SmartNode

Business Partnerships
Make Love, Not War!

Who Owns the Business Customer?

The answer depends on the details of the scenario. Is the customer loyal to a certain IP-PBX vendor? In this case the service provider would have to support and interoperate with the customer's preferred vendor in order to win their business. Is the business bound in a carrier or service-provider contract? If so, the carrier's interoperability capabilities may limit the business customer's choice of CPE elements: IP-PBX, UC platform, VoIP Gateway or SBC. The suppliers of those products may require carrier certification before they could sell to such customers. Is the business committed to a certain UC platform, such as Microsoft Lync or Lotus Sametime? That decision may define or limit their choice of phones, access-router, ITSP, etc, to those that are Lync or Sametime certified.

Vendor Loyalty and Market Share

Each player in the business communication market—service providers, software vendors, hardware vendors—works hard to win customer loyalty and market share. Everyone is defensive and protective of their hard-won slice of the pie, whatever its size.

Working Together

The Patton-BroadSoft solution offers a way for the various players to share business customers by working together. Rather than carriers competing *against* IP-PBX vendors and/or UC suppliers for a given customer, the Patton SBC provides ensured interoperability so the suppliers can approach the customer together with a joint solution. Patton provides the glue to cement such win-win business partnerships.

Operational Challenges

Although the Patton-BroadSoft automated-provisioning solution is fully capable of supporting touchless provisioning for hosted PBX services, the solution presented in this paper is not a hosted-PBX or public-cloud scenario. The service-provider business model presented here allows SMB customers the flexibility to choose and use any IP-based PBX or Unified Communication software and hardware they prefer. Swisscom delivers SIP-trunking service to the customer-premise iPBX. In order to implement such a business model, numerous operational challenges must be resolved.

Vendor Multiplication

There are dozens of vendors with iPBX products in the field. Similarly, a few very large vendors offer dozens of products. Vendors vary widely in how they implement certain details of the SIP "standard." Variations may include terminal registration behavior, number presentation, added or omitted features, authentication procedures, and others. While BroadSoft has verified a few iPBX products in formal interoperability testing, many have not been verified.

In many cases the provider will use an edge SBC to normalize and secure the interface to application servers. However, since such edge SBCs reside within the core network, they cannot be easily configured to support the dozens or hundreds of different CPE profiles.

Management Headaches and Liabilities

Managing a service delivered to a customer-selected (and owned) PBX also presents some issues:

- **Control**—Since the iPBX is installed, configured and managed by the customer's IT staff—or Swisscom integration partners—the service-provider cannot configure or manage the customer side of the service connection.

- **Set-Up**—Without an automated-provisioning process, setting up and activating the customer side of the SIP trunk will likely be inconsistent and error-prone.

- **Troubleshooting**—The access network between the subscriber's IP PBX or UC system and the carrier's edge SBC is often complex, comprising many such elements as routers, firewalls, modems, and so on. Identifying the source of a problem along this path is often time consuming and costly

Problems with Direct SIP

Directly connecting a SIP trunk to a customer's iPBX involves a number of difficulties for the carrier:

- **Divergent Customer Profiles**—The SBC within the carrier WAN would have to be configured with a different SIP profile for each and every iPBX in the field. The enormous scale and operational complexity of such a task is prohibitive.

- **Lost Opportunities**—A substantial segment of the subscriber market—businesses with PBX products that are not interoperable or validated with BroadWorks—would be eliminated.

Where's the Demarc?

With the SIP trunk terminating at the customer iPBX, the SIP service demarcation point is not clearly defined. Such lack of clarity leads to confusion and potential disputes about who is legally responsible if problems arise in the customer LAN that impair or disrupt SIP traffic flow thus degrading performance of the carrier-provided service.

The Patton Solution: SmartNode Enterprise Session Border Router (ESBR)

BroadSoft has tested and verified SmartNode VoIP CPE for interoperability with the BroadWorks VoIP platform. The solution presented here employs an Enterprise Session Border Controller (E-SBC) from Patton Electronics: the SmartNode Model 5300 Enterprise Session Border Router (ESBR). Deploying the SmartNode ESBR at each customer site provides the following solutions and value-added benefits:

- **Standardized Customer Interface**—SmartNode VoIP CPE have been tested by BroadSoft and verified for interoperability with the BroadWorks VoIP platform. Employing the SmartNode ESBR for each customer ensures a reliable and interoperable carrier-facing SIP interface with predictable, uniform characteristics and behaviors. The single, unified CPE interface greatly simplifies service provisioning. The carrier need not test and trouble-shoot the vast number of IP PBX products with the service. Since Patton maintains its own interoperability program, the ESBR provides a customer-facing SIP interface, which Patton has tested and validated with a large and growing list of IP PBX vendors. The ESBR's SIP-normalization function resolves any discrepancies between the BroadWorks and the customer PBX implementations of the SIP standard.

- **Touchless Automated Provisioning**—SmartNode Products come with Patton's free SmartNode Redirection Service. When the device first powers up it contacts the redirection server over the Internet to find, download and activate the correct configuration file from the carrier's configuration server. Patton's re-direction service enables zero-touch deployment with automated SIP-trunk service provisioning using SmartNode products.

- **Secure, Remote Management**—BroadSoft has verified SmartNode for interoperability with BroadWorks Device Management (DM). This means service providers can use the integrated BroadWorks DM to securely and remotely provision the subscriber side of the SIP trunk from within BroadWorks. The SmartNode configuration file is encrypted and securely delivered over the public network to the ESBR at the customer site. Login credentials are encrypted according to Digest Access Authentication (RFC 2617), protecting the remote CPE against any unauthorized access.

- **QoS and Traffic Management**—The SmartNode ESBR employs upstream QoS combined with Patton's advanced DownStreamQoS to ensure optimum voice quality within the customer LAN. SmartNode voice and data traffic management capabilities combined with CODEC transcoding enable WAN optimization on the SIP trunk.

- **Split Management Domain**—SmartNode provides a valuable feature called "Split Management Domain" that separates the customer-facing configuration from the carrier-facing configuration. This feature allows the service provider to manage the WAN-facing configuration while only the customer (and/or the integration partner that provides installation services) can manage the LAN/iPBX-facing configuration. The carrier-provider defines which SmartNode parameters may be configured by the customer/installer and which parameters are accessible only to the service-provider.

Split Management Domain also addresses security concerns on both sides of the service demarcation point. The customer's LAN-facing configuration is protected against unwanted access over the WAN, while the provider's WAN-facing configuration is protected from (perhaps inadvertent) meddling from the subscriber.

So the SmartNode ESBR standardizes the trunk side of the configuration and enables automated provisioning via Patton's Redirection Service together with the BroadWorks DM, while providing for management of the LAN/IPBX side of the configuration by the customer or Swisscom installation partners.
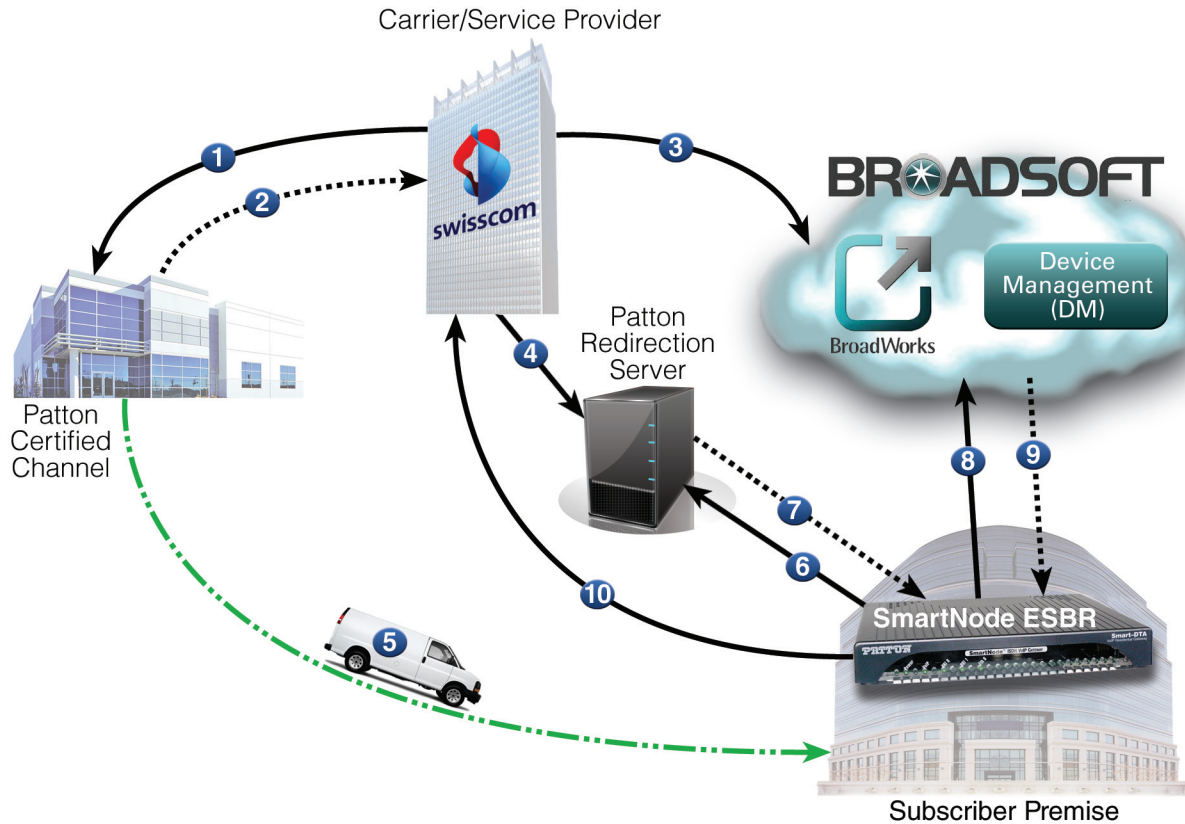
How it Works: the Big Picture

The drawing below provides a high-level overview of the Patton-BroadSoft automated-provisioning solution. Note that provisioning and management of the carrier-supplied SIP trunk service is managed by the carrier-provider in the cloud via the BroadWorks DM. The Patton SmartNode SBC, located on the customer premise, provides a split configuration domain. Within the SBC, the WAN-trunk side of the configuration (managed by the carrier), is separated from the LAN side (managed on the customer premise using Patton's configuration Web wizard). Patton's SBC provides ensured interoperability between the customer-selected IP PBX or UC system and the carrier-provider's SIP trunk service, edge router/SBC and softswitch.
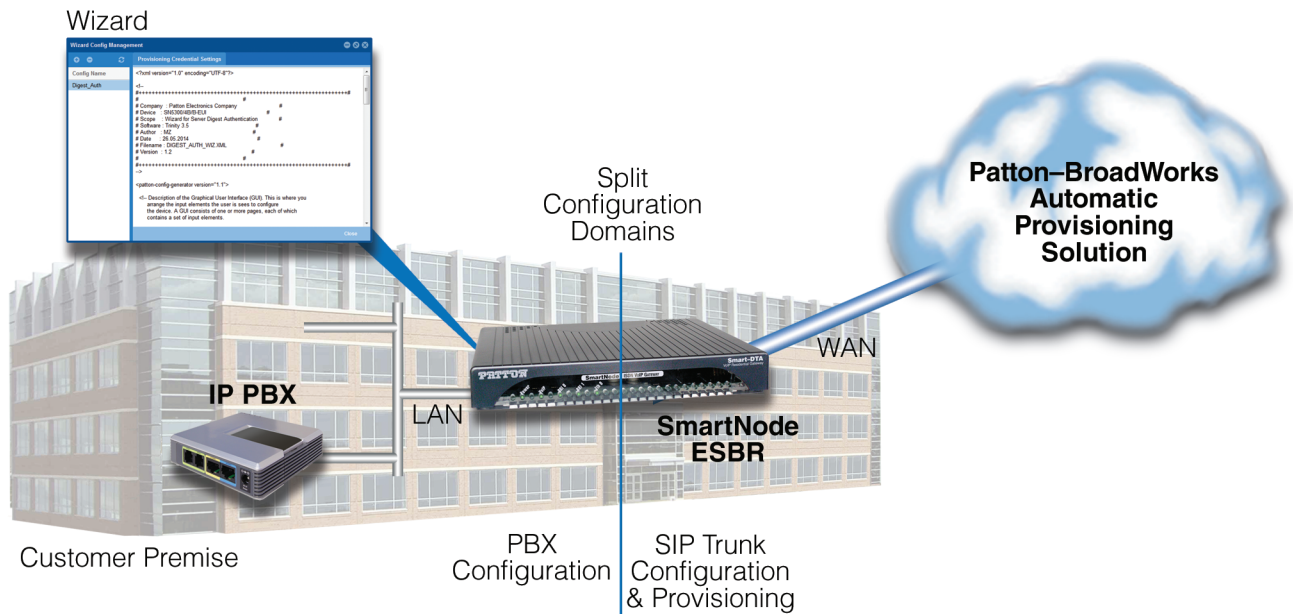
How it Works: Step-by-Step Provisioning Flow

Touchless Automated-Provisioning Process Overview

The drawing below shows the step-by-step process for touchless automated provisioning of the Patton SmartNode ESBR. The process integrates elements and actions involving three parties: Patton, BroadSoft, and the Carrier-Provider.

Carrier/Service Provider

Patton Redirection Server

SmartNode ESBR

Patton Certified Channel

Subscriber Premise

The solid arrows in the above drawing indicate an initiating step (poll), while the dashed arrows indicate a subsequent action (response). The following section describes the steps are described in detail.

Touchless Auto-Provisioning Steps

1. Carrier-Provider orders SmartNode CPE for a given subscriber from a Patton Certified Channel.

2. Patton Certified Channel forwards the MAC address of the just-ordered SmartNode to the Carrier-Provider.

3. Carrier-Provider sends a message to the BroadWorks Device Management Server that includes subscriber telephone number, password, SmartNode MAC-address, and any other required parameters.

4. Carrier-Provider sends a message to the Patton Redirection Server including the SmartNode MAC address and the IP address of the BroadWorks Device Management Server.

5. Patton Certified Channel ships the SmartNode to the subscriber premise.

6. SmartNode arrives at the subscriber premise. Subscriber's IT staff—or a system integrator contracted by the carrier (installation partner)—installs the SmartNode on the subscriber premise. When powered up, the SmartNode automatically sends a request to the Patton Redirection Server.

7. Patton Redirection Server sends a response that includes the IP address of the BroadWorks Device Management Server.

8. SmartNode sends a provisioning request to the BroadWorks Device Management Server.

9. BroadWorks sends the SmartNode configuration file (and if necessary, the latest firmware revision) to the SmartNode.

10. SmartNode installs the configuration (and firmware), thus activating the SIP trunk connection to the carrier-provider.

The figure below presents an alternate visualization of the step-by-step process for the Patton-BroadSoft automated-provisioning solution.
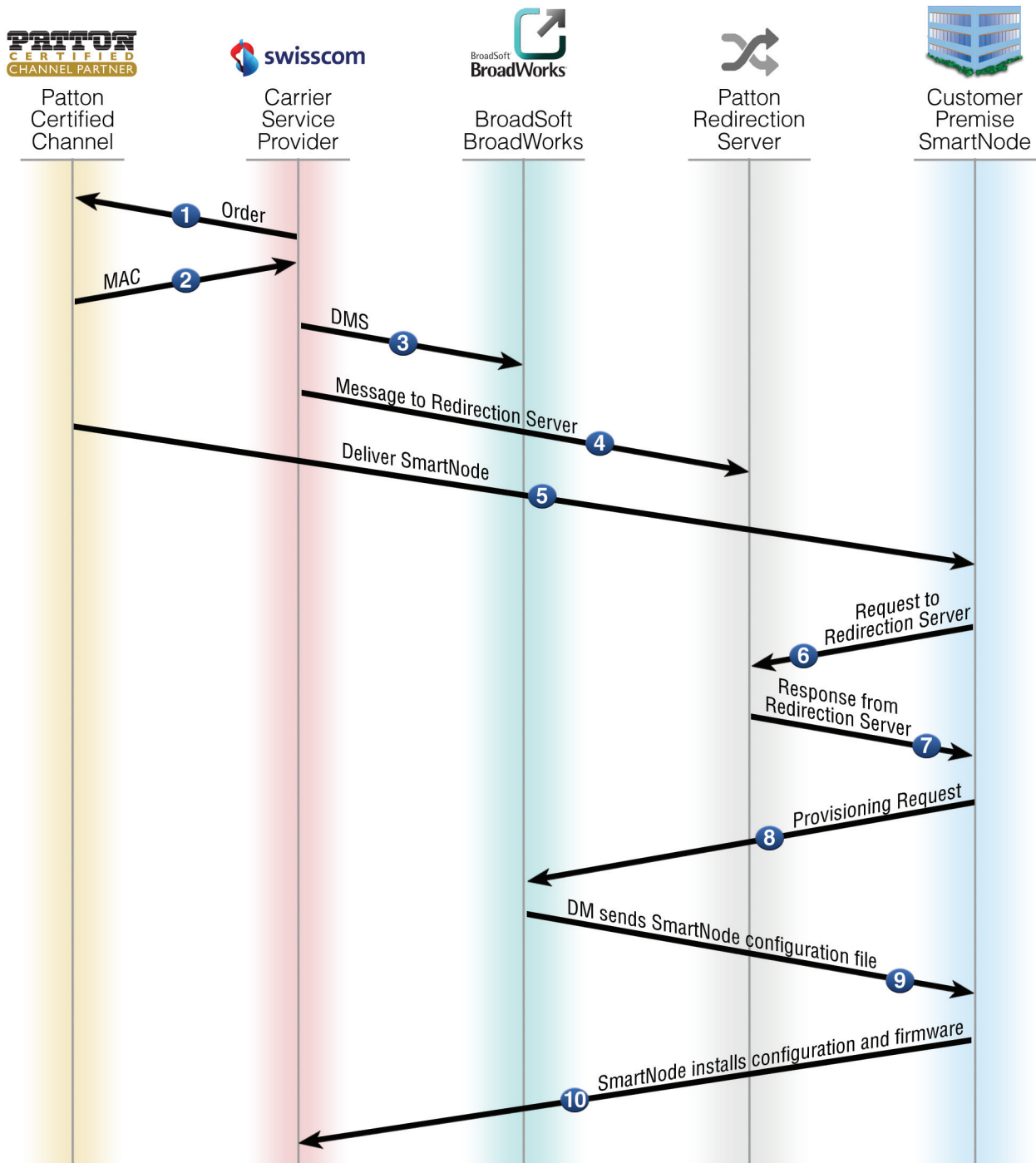
Subscriber Side Configuration: The WEB Wizard

Further facilitating the SmartNode split management domain*, SmartNode ESBRs come with a configuration Web Wizard. Patton's **WEB Wizard** makes installation faster and easier for Trinity-based SmartNode models—and all Patton products that run the Trinity operating system. For a complete listing of all Trinity-based Patton products, go to www.patton.com/products/trinity.

In applications where configuration settings are similar from one installation to another, the WEB Wizard is a powerful time-saving tool for carriers, installers, and end customers. To quickly and easily get a Trinity-based device up and running, simply launch the Wizard and enter the customer credentials.

For carrier installation partners and end-subscriber IT staff, details on setting up and using the Wizard are provided in the Patton publication Trinity Wizard Programmers Guide. The guide is available for download at www.patton.com/support/kb_art.asp?art=423.

To help new WEB Wizard users get started creating their own wizard files, Patton has also published an example configuration generator for the SN4970. The Trinity Config Generator is available for download at www.patton.com/support/kb_art.asp?art=424.

Further Value Add

The SmartNode product line, from Patton Electronics also offers carrier-providers the following value-added attributes:

- **Digital & Analog Legacy Telephony Interfaces**. The SmartNode portfolio offers a complete range of CPE devices with digital ISDNBRI and PRI interfaces as well as POTS analog FXS/FXO interfaces available in flexible combinations supporting 2 to 120 concurrent VoIP or fax calls. This means car-

riers can count on a single supplier for VoIP CPE with all the same subscriber and management features for legacy PBXs in both ISDN and POTS customer voice-network environments.

- **Free Support/Low TCO**. Patton does not charge separately for support or maintenance. The company provides free customer support (live human email and phone support) and free lifetime software upgrades with every product sold. Eliminating costly maintenance contracts or hourly support fees drives down total cost of ownership (TCO) for carriers that select this vendor. As if this writing, Patton is the only player in the E-SBC market that offers such a free support proposition.

Conclusion

Against the backdrop of fierce competition for customers in the IP-based business communications market, Patton, in partnership with BroadSoft, offers a win-win technology solution that promotes cooperative partnerships among service providers and product suppliers—with profits for all.

Several technology innovations converge to enable the Patton-BroadSoft automated-provisioning solution, including the BroadWorks DM, the Patton redirection service, and the split configuration domain and configuration Web Wizard in Patton's SmartNode SBC products.

Streamlined touchless, remote provisioning, troubleshooting, maintenance, and control of the BroadSoft SIP trunk from DM—all the way to Patton's customer-premise SBC—provides a smooth and painless customer experience for the customer CEO and workforce when implementing an IP-based communications solution. The resulting fast, easy, low-cost service turn-up and delivery, offers carrier-providers lower churn, higher ARPU and more profitable delivery of SIP trunk services.

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* Split management domain enables standardized trunk-side configuration for automated provisioning, while allowing the customer or the carrier's installation partners to manage the subscriber-side LAN/IPBX segment of the configuration.