WHITE PAPER

Software-Defined Voice Network

Digital Transformation for Communications
and Collaboration Solutions

audiocodes

Software-Defined Voice Network is an innovative approach to digital transformation in large enterprise communications and collaboration networks that promises to optimize network performance and reduce operational costs without having to replace existing voice solutions.

1. THE NEED FOR DIGITAL TRANSFORMATION IN VOICE COMMUNICATIONS

There is no escaping the wave of digital transformation sweeping through businesses and organizations across the globe. With its promise of delivering enhanced productivity and cost savings, it is impossible for IT managers in any industry to ignore the trend.

In parallel with this change, most major telephony service providers have called end of life on their existing ISDN-based PSTN infrastructure. Multinational carriers such as Deutsche Telekom, BT and AT&T have all announced their intention to switch off their PSTNs within the next 5 to 10 years while moving to an all-IP setup.

Another challenge facing IT managers of large distributed enterprises is the variety of communications solutions in use even within a single organization. Mergers and acquisitions over the years, different functional requirements and local regulation are just some of the reasons why enterprise voice networks are extremely complex and hard to manage and operate efficiently. IT managers are looking to digital transformation to deliver efficient and cost-effective solutions for running their networks, as well.

In this white paper we will introduce the **Software-Defined Voice Network**, an innovative approach to digital transformation in large enterprise communications and collaboration networks that promises to optimize network performance and reduce operational costs without having to replace existing voice solutions.

2. INSPIRED BY SOFTWARE-DEFINED NETWORKING

Before we introduce our solution, let's take a look at how data network vendors and operators have adapted to cope with the growing needs for performance and manageability over recent years. With demand for data traffic skyrocketing, managing monolithic data routers and infrastructure was becoming increasingly difficult to achieve.

Software-defined Networking (SDN) provided the answer to many of these issues. By decoupling the network infrastructure layer from the business applications and adding an additional control layer to mediate between the two, SDN represents a powerful solution that is dynamic and agile, allowing multiple services to be delivered over the same infrastructure. Using open APIs, new applications can be added to the network relatively easily without having to make any changes to the underlying physical network.

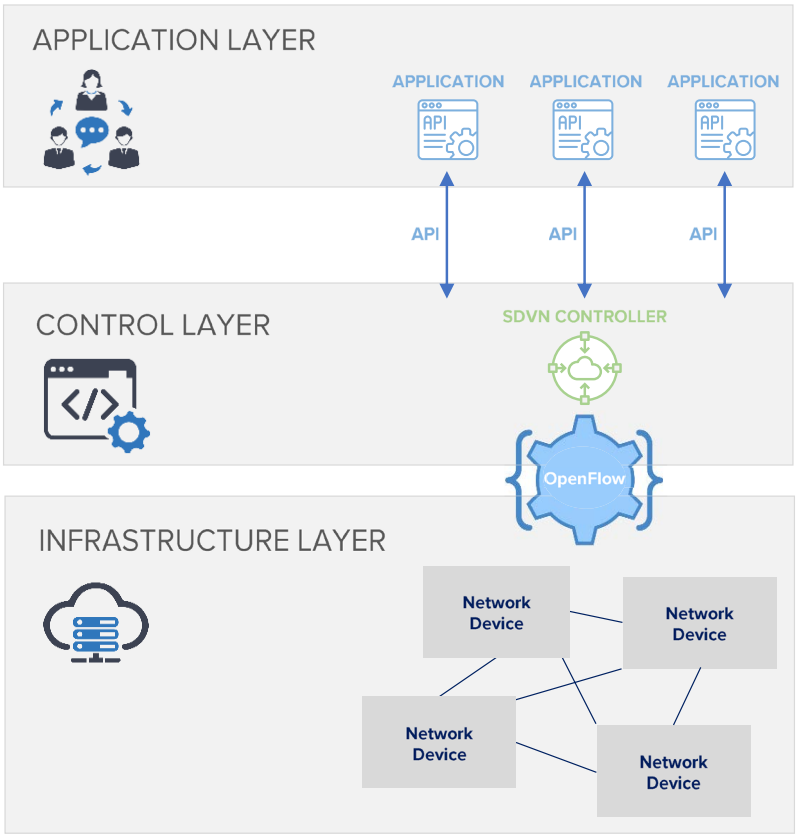

FIGURE 1 – Software-defined network architecture

3. INTRODUCING THE SOFTWARE-DEFINED VOICE NETWORK

The issues and complexities that led to the development of SDN in the data networking world are very similar to those facing operators and managers of large corporate voice networks, as we mentioned in the introduction to this document. Consequently, it makes sense to adopt an approach that translates the underlying principles and architecture of SDN into the world of voice, namely **Software-Defined VOICE Network** or **SDvN**.

SDvN is an innovative overlay solution for the design and operation of large multi-vendor voice communication networks based on SDN principles. Just as in SDN, the SDvN architecture decouples the voice network control layer from the voice infrastructure layer, paving the way for centralized network and call routing management. This, in turn, facilitates simplified integration with new and existing voice applications which reside in a separate voice applications layer.

Thanks to the centralized nature of the SDvN architecture, operators can benefit from a **network-aware solution** that applies **optimized call routing logic and operations** to the entire corporate voice network. Furthermore, as an overlay network, the SDvN solution is **vendor agnostic** – any existing or new voice solutions can be integrated into the architecture regardless of whether they are on-premises or cloud-based. SDvN allows organizations to **migrate gradually to a global unified communications solution** in a controlled and gradual manner without having to resort to a forklift upgrade approach.

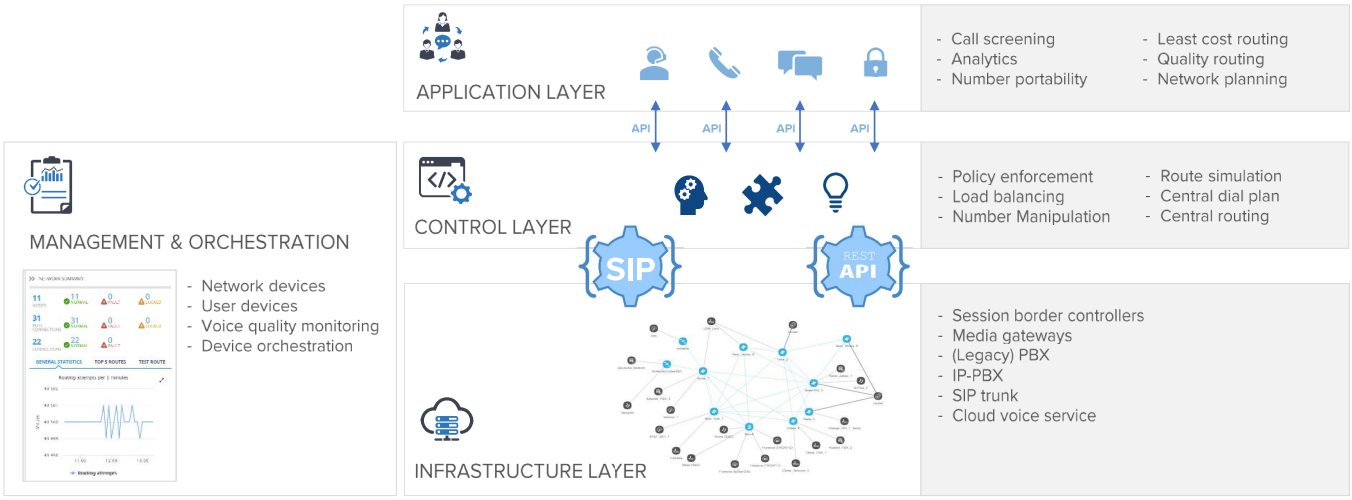

FIGURE 2 – Software-defined voice network (SDvN) architecture

Let's take a closer look at the 3-layered architecture of the SDvN solution.

- **VOICE INFRASTRUCTURE LAYER**

  At this layer we find the fundamental components of enterprise voice solutions. Session border controllers (SBCs) and media gateways have traditionally provided all that enterprises need in terms of **voice services and connectivity with IP-PBXs, PBXs, the PSTN and SIP trunks**. While some large organizations have successfully standardized their infrastructure on a single solution, it is just as common to find multiple vendor solutions in use across their branches. Today, the situation is complicated even further by the growing popularity of **cloud-based offerings** either for unified communications (such as Microsoft Teams) or specific communications applications (like Zoom for conferencing).

- **VOICE NETWORK CONTROL LAYER**

  This layer is the brains of the entire operation. The elements at this layer define **centralized dial plans and user-related policies** for the whole network, control call routing and generally enable all the disparate components in the infrastructure layer to communicate seamlessly with one another.

- **VOICE APPLICATION LAYER**

  In SDvN, the voice application layer includes **functionality that extends the capabilities provided by the control layer**. Among the functions that can be supported in the application layer are least cost routing, quality routing, analytics and web-based services, such as number portability and call screening. Voice applications can be delivered in house or by third parties and are integrated with the control layer elements via open APIs.

In addition to the three functional layers of the SDvN solution, administrators need to have the ability to **manage and orchestrate the entire operation**. Network device management, user lifecycle management and voice quality monitoring are all vital for keeping the SDvN network running smoothly and reliably while remaining agile enough to handle rapidly changing needs.

4. SDvN USE CASES

Now that we have described the fundamentals of the SDvN architecture, let us look at some common use cases for which SDvN provides an effective solution.

The existing communications infrastructure of many organizations tends to be focused on a legacy, on-premises PBX with a local PSTN connection, usually PRI. With telecom carriers transitioning their infrastructure from TDM to VoIP and shutting down their class 5 switches, they are forcing their customers to move from traditional TDM-based connectivity to SIP trunks.

This is an inevitable consequence of moving to all-IP but it has many advantages. SIP trunks by their very nature offer flexibility, scalability and cost-effectiveness but achieving these benefits lies in the technology used to connect to them.

FLEXIBLE VOICE CONNECTIVITY

A central component of any all-IP deployment is the session border controller or SBC. SBCs are designed to bridge the gap between VoIP platforms and networks, ensuring seamless SIP trunk connectivity with interoperability between different systems and security for protecting calls and preventing attacks.

SBCs offer connectivity between IP-based networks but can also offer hybrid configurations where both VoIP and traditional TDM telephony connections are supported on the same platform.

Another important aspect of SBCs' role is their ability to deliver critical security features. Since SBCs represent a clear demarcation point between the service provider's network and customer premises, they function as a kind of voice firewall performing critical security functions that protect organizations' networks and data from malicious attacks and fraud.

For many organizations where legacy TDM-based telephony platforms are still in use, deploying a hybrid SBC enables immediate connectivity with SIP trunks while the migration to an IP-based UC solution, such as Microsoft Teams or Skype for Business, can be carried out gradually, at a controlled pace.

CENTRALIZED CALL ROUTING AND POLICY MANAGEMENT

Once all these connectivity solutions are in place, large distributed organizations need to be able to efficiently control and manage the entire network. Centralization of the enterprise routing management and dial plans is thus a key element in achieving a successful all-IP transition. A centralized call routing solution eliminates the need to configure each PBX, SBC or gateway whenever a change in dial plan and routing is required (such as the addition of a new branch or SIP trunk connection). The centralized approach provided by SDvN both saves time and minimizes the chance of errors occurring in the routing configuration process.

With a network-wide view at its disposal, the centralized call routing management solution can take routing decisions based on a range of different criteria, such as to which user group a caller belongs, from which node (SBC) a call has originated, or the quality of service expected in each optional route. This solution can also provide network-aware load balancing to ensure efficient use of network resources and deliver high service availability.

5. AUDIOCODES SDvN COMPONENTS

AudioCodes is a leading vendor of advanced voice networking and media processing solutions for the digital workplace. With vast field experience and proven interoperability with leading voice platforms and networks, AudioCodes' range of products and solutions assists enterprises in achieving a smooth and seamless transition to all-IP infrastructure.

AudioCodes offers a range of products that form the building blocks of the SDvN solution's network infrastructure and control layers.

VOICE NETWORK INFRASTRUCTURE LAYER

AudioCodes' wide range of **session border controllers (SBCs)** delivers secure, smooth connectivity between VoIP networks, traditional telephony platforms and networks, and cloud-based communications services, making them highly suitable for migration to all-IP infrastructure. In line with the ever-increasing adoption of cloud technologies and infrastructure, AudioCodes SBCs are available as appliance-based or virtualized solutions with the ability to be deployed in private or public clouds, and support the scale and high availability required by large organizations.

AudioCodes **MediaPack analog gateways**, including the high capacity **MediaPack 1288**, enable legacy analog devices to be integrated into all-IP environments.

AudioCodes is a leading vendor of advanced voice networking and media processing solutions for the digital workplace.

VOICE NETWORK CONTROL LAYER

The **AudioCodes Routing Manager (ARM)** solution delivers flexible and powerful centralized call routing and policy management via an intuitive graphical user interface. ARM enables routing management for any SIP-based SBC, whether from AudioCodes or 3rd party vendors. Through its built-in northbound REST API, ARM enhances the capabilities of the solution by integrating with external third-party systems (forming the voice application layer) to deliver enhanced voice functionality such as call screening, least-cost routing and voice analytics.

NETWORK MANAGEMENT AND ORCHESTRATION

AudioCodes **One Voice Operations Center (OVOC)** is a voice network management solution that combines management of voice network devices and quality of experience monitoring into a single, intuitive web-based application. OVOC enables administrators to adopt a holistic approach to network lifecycle management by simplifying everyday tasks and assisting in troubleshooting all the way from detection to correction. OVOC can provide network data for further processing by external analytics such as Splunk and PowerBI.

User Management Pack™ 365 is a powerful software application that simplifies user lifecycle and identity management across unified communications deployments.

For further information about SDvN and how it can assist large organizations in their digital transformation journey, visit the **AudioCodes website** or **contact your local AudioCodes team**.

About AudioCodes

AudioCodes Ltd. (NasdaqGS: AUDC) is a leading vendor of advanced voice networking and media processing solutions for the digital workplace. With a commitment to the human voice deeply embedded in its DNA, AudioCodes enables enterprises and service providers to build and operate all-IP voice networks for unified communications, contact centers and hosted business services. AudioCodes' wide range of innovative products, solutions and services are used by large multinational enterprises and leading tier one operators worldwide.

International Headquarters
1 Hayarden Street, Airport City
Lod 7019900, Israel
Tel: +972-3-976-4000
Fax: +972-3-976-4040

AudioCodes Inc.
200 Cottontail Lane,
Suite A101E,
Somerset, NJ 08873
Tel:+1-732-469-0880
Fax:+1-732-469-2298

Contact us: www.audiocodes.com/contact
Website: www.audiocodes.com

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