

The Distributed Service Network Architecture Approach for Russian Networks Planning

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Abstract—The NGN concept is implementing on the operator networks by SoftSwitch platform and IP Multimedia Subsystem (IMS) platform up to now. The functional requirements and architectures were determined at ITU-T recommendations Y.2012 and Y.2021 for SoftSwitch and IMS respectively. Both of these platforms have the accomplishments and limitations. The Distributed Service Network (DSN) became a new platform for NGN concept implementation. New DSN and IMS combined network architecture is proposed for Russian networks future architecture.

Keywords— DSN, IMS, network structure

I. INTRODUCTION

NGN’s evolution is conditioned by fast spread of P2P (point-to-point) technologies, and these technologies nowadays prevail in flow based Internet applications. And the Distributed Services Network is a new conception [1] of the NGN’s evolution. There are some different estimates made

by experts about parts of P2P traffic, dominating in general traffic of Internet services like Bit Torrent. However, if we take into consideration even conservative predictions made by Cisco [2], the growth of traffic would be more than 7 Pet bytes in a month till 2014. That’s why, as the authors think, the new way to adaptation of Russian network to the P2P traffic’s growth is the implementing of DSN conception. It can give a new impulse to NGN transformation process and provide CAPEX/OPEX reduction.

II. DSN ARCHITECTURE

The DSN architecture is shown on Figure 1.

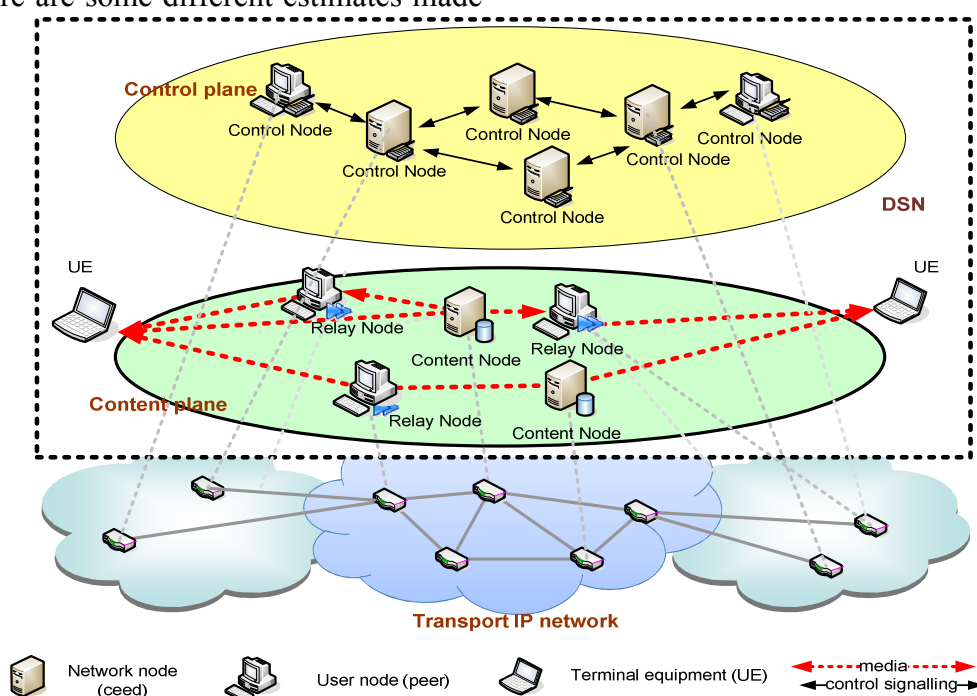


Figure 1. Common DSN Architecture

In the DSN architecture conception two principal types of nodes: core node and user node (peer) are determined unlike the existing multilayer hierarchical network architecture. Network nodes as a rule are relevant to operator's or provider's domain (access and aggregation network IP/MPLS core and so forth); user nodes as a rule are relevant to subscriber's domain (PC, mobile terminals and so forth).

DSN network includes content and control planes. Content plane consists of content nodes and relay nodes. Content plane implements such functions as content keeping, caching and load balancing. Content plane is media sphere (media streams are painted red). Control plane provides DSN signalization system; its streams are painted black. Control node provides close coordination with transport IP network.

Terminal user equipment (UE) in coordination with control plane nodes provides searching of the required content in DSN network and its receipt in coordination with content distributing plane nodes.

Meanwhile user equipment may combine functions of content translation node and UE ones. From the hierarchical point of view DSN nodes divide into network ones situated within confidential operator's network and user ones (situated on the user's side).

In SG13 ITU-T working papers main advantages DSN architecture are examined with following examples of services realization, these examples may considered the base ones:

- multimedia telephony services;
- stream services;
- content distribution;
- scaleable high-speed multimedia services.

In the near future heavy multimedia content would become one of the most needed applications. However, such content requires essential increasing of a band and connection nodes efficiency. Operators have to place new and new stream servers to carry the quality of service. This situation influences CAPEX/OPEX negatively. There are typical requirements to existing networks: band about 10 Mb/s, delay less than 10 ms, jitter – 10 ms. These requirements are supplemented with high requirements to routing planning and QoS control. The intellectual routing DSN mechanism provides

end-to-end routing functions for all system and guaranteed characteristics QoS for high-speed multimedia services while characteristics CAPEX/OPEX stay acceptable [3]. Disappointingly, the authors are not informed about examples of large network operator's class infrastructure practical realization.

III. SCENERIES OF DSN DEPLOYMENT ANALYZING

Basic approaches to practical DSN realization are offered to operators as two main ideas: private infrastructure limited by operator's network and Internet infrastructure [1].

DSN deployment as private infrastructure limited by one operator's network should be based on service providing just in limits of confidential segment (access from Internet is closed) and that is a guarantee of high security and control. However this way lets reach only own communication nodes recourse using optimization without involving of Internet environment.

On the base of private DSN infrastructure some services might be provided: telephony services on batch (packet) technology base (VoIP), content delivery services (IPTV, VoD), files transmission in real time, high-speed multimedia services, distributed computing services, telemetry services etc. with considerably greater opportunities of scaling. Meanwhile private DSN infrastructure provides coordination with traditional networks for supporting existing services.

When Internet structure is developing, all services provided by DSN nodes become available from Internet. The DSN nodes themselves include not only operators' equipment, but great amount of users' nodes, connected to Internet. Evident disadvantages Internet DSN infrastructure development makes us to think about coexistence and coordination of both strategies. Specific illustration of such coexistence and coordination may become appreciable components decreasing of traditional IMS solution (Figure 2) and these functions realization in one device (IMS in one box) [4].

The quantity of such nodes may be considerable; however the requirements to equipment are moderate.

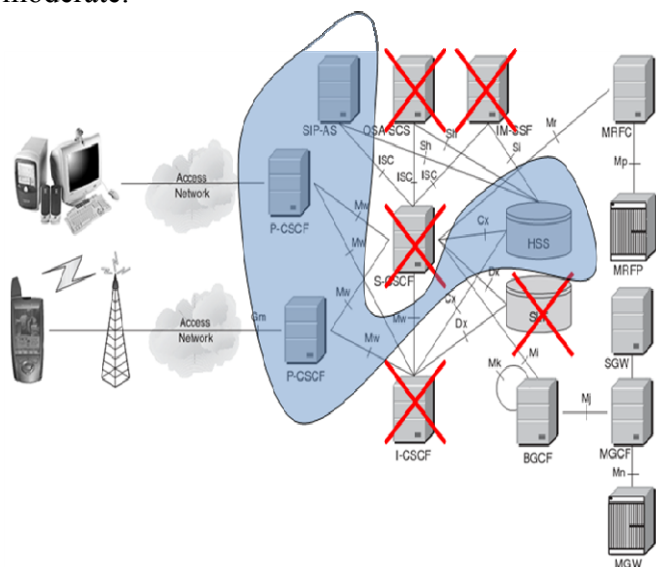


Figure 2. IMS transformation using DSN

Let's take into consideration the classical approach to POTS on the architectural base of SSW/IMS introducing in Russia by so called "traditional operators" (PTT) – by regional branches of OJSC "Rostelecom" (Figure 3).

The first step of transformation is related with TDM exchanges replacement on the toll and international level based on SSW/IMS platforms and backbone packet transport networks. Looking forward to the Russian telecom regulatory rules changing the SSW/IMS platforms could cover all services inside the regions based on packet transport networks. All interconnections will be provided via SBCs. The TDM share is decreasing to complete out from operation till year 2015.

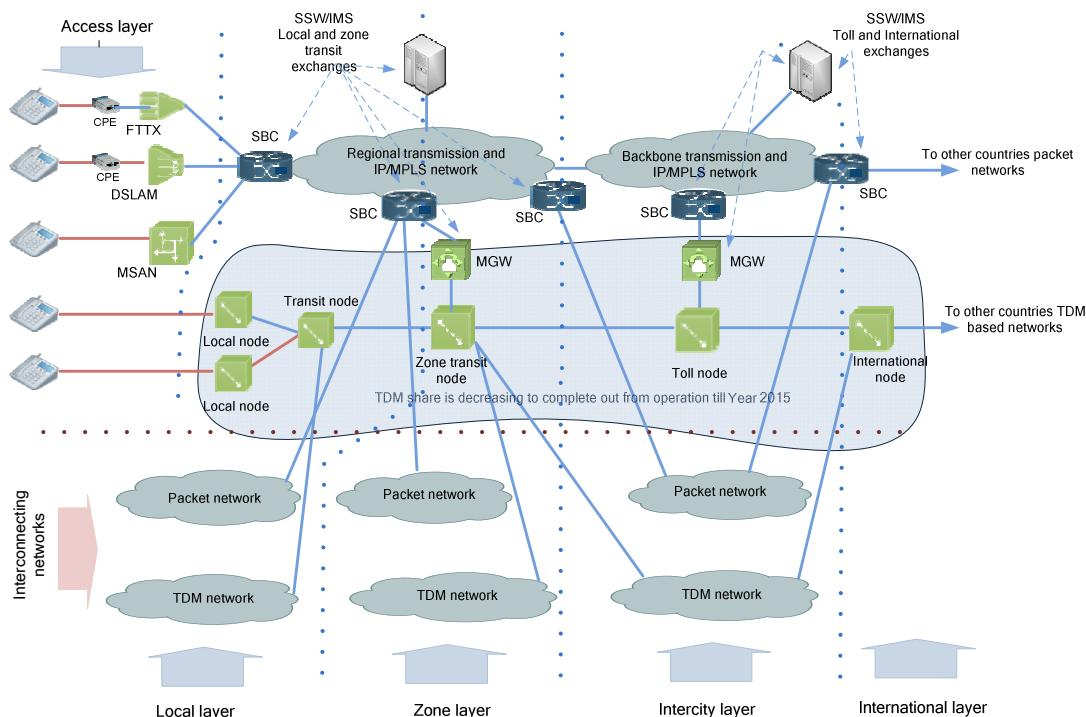


Figure 3. Target Fixed Network Architecture of OJSC "Rostelecom" for perspective till 2015

It is evident that DSN approach would cardinaly change target network architecture (Figure 4) comparably with classical approaches based on SSW/IMS and introducing by such system formation operators like "Rostelecom".

Passage to DSN architecture would require to organize some work package connected with designing of conception, development principles, architecture solutions, plans of service providing, some measures for providing information security,

systems of control, caching, and load balancing with monitoring. It is evident that this problem examination would take place within conditions of

inevitable partial inclusion of DSN class structure into Russian Federation public networks.

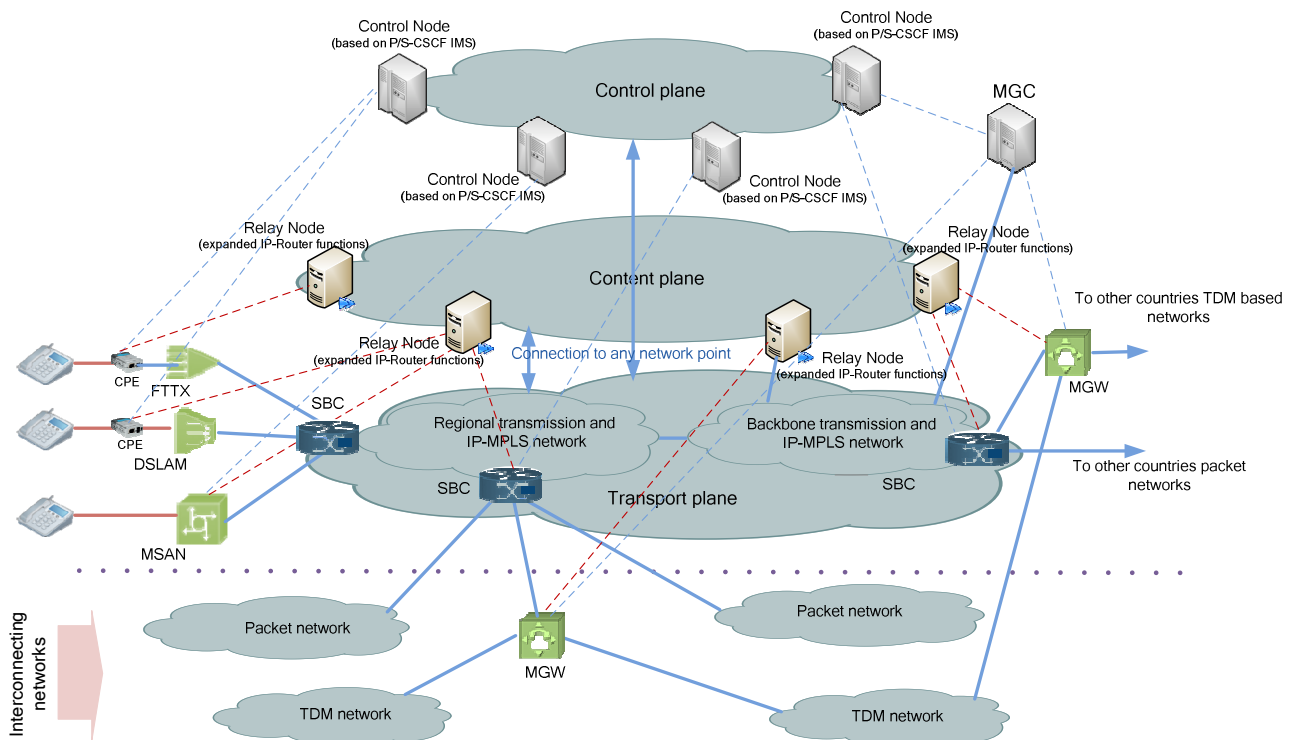


Figure 4. Target Fixed Network Architecture of OJSC “Rostelecom” for perspective after 2015

IV. CONCLUSIONS

On the ground of stated information, we may make a conclusion that for such prominent Russian working operators like OJSC “Rostelecom” passage to DSN architecture is improbable during the nearest 3-5 years.

To introduce this technology in Russian communication networks we'll have to carry out a number of researches in the field of conceptual examination of the following main questions:

- typical communication networks models connected with DSN technologies development. It should be done with regard to Russian networks, subject to existing standard base and existing networks construction practice;
- typical plans of introducing DSN technologies into existing Russian Federation communication networks development;

- development of typical algorithms for services providing and their introducing into Russian Federation communication networks for base DSN services.

Russian standard base for DSN using networks should be formed on the basis of carrying these examinations out and working with such international organizations in the field of telecommunication as ITU, ETSI. The main ideas would be recorded (entered) as an international standard or the component of it.

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