Domain Name System and Internet of Things (IoT) for Mobile Network Operators

A Technical Case Study Featuring Swisscom by FusionLayer Inc.

Domain Name System and Internet of Things (IoT) for Mobile Network Operators by FusionLayer Inc., January 2021.

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FusionLayer Enables data roaming and facilitates the introduction of LTE and IoT

The Customer Profile

Swisscom is Switzerland's leading telecom provider and offers mobile communications, fixed networks, Internet, and digital TV to corporate and residential customers. With a turnover of CHF 11.4 billion, Swisscom serves more than six million mobile subscribers every day.

GPRS to LTE

Since its introduction in the late 90s, mobile data services have relied on General Packet Radio Service (GPRS) standard. This technology has been the facilitator of mobile roaming, allowing mobile subscribers to access data in their home network also when on the move. Initially starting as bilateral exchanges between select mobile providers, GPRS roaming has later evolved into a global network that facilitates international roaming and allows subscribers to be connected anywhere in the world. Behind it all, the Domain Name System (DNS) has played a critical role by simplifying the linking process between regional and local operators.

In the same way as the Internet, GPRS is mapped using DNS. This mapping allows operators and users of the mobile networks to work with names instead of cumbersome IP addresses. Furthermore, Long Term Evolution (LTE) networks, as well as Machine-to-Machine (M2M) communications carried out over mobile internet, will utilize similar technologies.

To cope with the evolution of mobile devices and always-on connectivity, MNOs have had to increase transmission capacity and expand wireless network coverage. As part of the process, MNOs have replaced circuit switching with packet switching, leading to an increasing number of IP-based network components, redundant instances, and load balancing equipment.

Due to the increased mobile network capacity and usage of mobile internet, wireless networks have grown to become more complex and transmit more data than ever before.

Mobile network operators' DNS platforms must include their entire network equipment topology and the path selection rules used to manage this explosive growth. Imminently as mobile internet accelerates, amplified by the Internet of Things (IoT) and M2M communications, traditional DNS platforms offered by network equipment manufacturers will simply fall short of MNOs' needs.

The Challenge DNS platform for LTE and all previous data services:

- Steady processing of 50,000 to 100,000 queries per second
- Implementation of Quality of Service Policies (DSCP)
- Operable in an environment that is isolated from the internet
- Industry-standard DNS engine (ISC BIND)

On the other hand, while security measures such as the deployment of DNSSEC are effective in their own right in improving the trust in the protocol, to increase network security and eliminate the possibility of human error, DNS management processes should be automated. In addition, this has to go one step further an

> Swisscom recognized early that LTE will dramatically increase the load on DNS servers. Swisscom selected Safe Swiss Cloud and FusionLayer to eliminate the bottleneck before it ever became an issue

Centralized and automated management:

- Graphical User Interface (GUI) for managing zones and views
- Role-based Access Control (RBAC) and authentication for different groups of administrative users
- Powerful search and management automations
- Documentation fields, log files, and audit trails
- Support multi-vendor DNS environments
- Application Programming Interface and command-line (CLI)

Security, Availability, and Monitoring:

- Hardware redundancy
- Network access through various separated infrastructures with failover and load balancing
- System Administration through GUI and CLI
- Integration in customer-specific monitoring-, mail- and backup-infrastructure

Software Appliance Benefits vs Hardware-Based DNS

Using productized software appliances minimizes overheads associated with system integration and engineering.

Hardware-based DNS appliances typically involve a rigid solution architecture that does not facilitate customer-specific needs and offers no support for emerging technologies such as Network Functions Virtualization (NFV).

Even after installation, software appliances allow additional software components and settings adjustments down to the OS level.

> Patented software appliances by FusionLayer helped Safe Swiss Cloud in designing a next generation DNS platform aligned with Swisscom policies and general best practices.

The Solution:

Industrial standard hardware by Hewlett-Packard involving HP ProLiant DL servers with Solid State Discs (SSD); and Software appliances by FusionLayer:

DNS servers: FusionLayer DNS

Management: FusionLayer NameSurfer (DNS Hidden Primary)

The FusionLayer products ship with hardened Linux OS, firewall, native Intrusion Prevention System (IPS), and DNS rate-limiting, all in a productized server stack.

Integrator – Safe Swiss Cloud

- Hardware assembly
- Software Installation
- Licensing
- Repository Mirror
- Updates on all levels
- Configuration
- Image of the actual networks
- Data Import
- Testing as far as possible
- Improvements
- Recovery DVD
- Documentation (Wiki)
- Internal acceptance
- Shipping to various locations

> At the end of 2017, the Swisscom 4G+ network had been Made available to 67% of the Swiss population

Customer – Swisscom

- Internal acceptance
- Shipping to various locations
- Rack mounting
- Power supply

- Network connections
- Firewall configuration
- SSL Certificates

Joint Activities – Safe Swiss Cloud and Swisscom

- SSL Certificates
- Commissioning in Swisscom Lab
- Admin training
- Acceptance in Swisscom Lab
- Commissioning and acceptance in production (during a maintenance window)

> **As part of a maintenance contract with Swisscom, Safe Swiss Cloud does, if necessary, manual updates of the OS and the FusionLayer products provides 2nd level support and claims 3rd level support from FusionLayer if needed.**

The Outcome

Through the use of industry-standard hardware and productized software appliances, FusionLayer's next-generation DNS platform was deployed quickly.

Thanks to FusionLayer's centralized management system, only marginal training for Swisscom was needed to utilize the solution.

Swisscom can now apply software updates and minor/medium customizations during operation with no downtime.

The new solution allows Swisscom to:

- Manage DNS views and zones for LTE
- Detect and manage LTE-specific objects in DNS zones
- Import rules (NAPTR / SRV) for LTE
- Delegate namespace for Internet of Things (IoT) and M2M
- Convert Local Root Zone to Global Root Exchange (GRX) and eliminate the local GPRS zone

> FusionLayer support acts immediately after opening of support cases.

About Safe Swiss Cloud

Safe Swiss Cloud is a leading provider of European enterprise cloud infrastructure and managed services in privacy-sensitive business areas including banking, insurance, and health care. Safe Swiss Cloud is also specialized to serve the needs of software vendors and developers. Its agile services are optimized for DevOps processes and implemented with the help of technologies such as Docker Containers and OpenShift.

Banks, FinTech, MedTech, software companies, and other companies entrust their mission-critical IT infrastructure to Safe Swiss Cloud. Visit https://safeswisscloud.com

About FusionLayer

Managing complex corporate and telecom networks is a challenge where the cost of failure is enormous. FusionLayer collates all network information into a single Network Source of Truth, accessed securely by both engineers and automation to eliminate the chance of network downtime – on-premise, at the edge, and in the public cloud. This provides our customers with reassuring real-time information, so their digitalized operations can connect 24x7x365.

For details, visit https://www.fusionlayer.com/