

Virtual xDSL services and SLA maintenance

DSLAM/BRAS infrastructure sharing

While having your own fully managed and operated infrastructure can provide ultimate benefits for telcos, in a wellsaturated last-mile market this is not always the best option. Instead of investments in similar technology, substantial parts of the infrastructure can be leased or shared between operators, allowing for an increase in service flexibility and a balance in market exploration.

Outsourced scenario also comes with great benefits for telco's and end-users. All parties benefit from significantly extended service availability and decreased costs. Telcos can focus on the introduction of new technologies and valueadded services in their well-explored locations and increase awareness of their services in previously unavailable regions. Regulatory requirements for network interoperability as well as historical rivalry between operators make such cooperation even harder while decreasing openness between the parties at the same time.

A typical European example would involve a local infrastructure owner operating last-mile links. These loops – which may involve any service technology such as DSL, FTTx, HFC – are then made available to telcos as a base for their services. As a result, the end-user is free to choose one of the operators and his service, while technically he is always served on **the lessor infrastructure** up to **DSLAM/BRAS device & POP** and there is no need to change this cabling for changed services.





Service Level Agreement in shared infrastructure scenario

Being satisfied with the service is always a derivative of the **Service Level Agreement fulfillment**. Ideally, the shared infrastructure operator shall deliver **metrics and key performance indicators** proving track of his 'infrastructure as-a-service' including their characteristics, maintenance, outages and other factors. Unfortunately, such data is normally delivered in large batches – typically on a monthly or even quarterly cycle. What's more, having access to such KPIs any later than 'at once', means the lack of satisfaction of the end-user. And if KPIs are not satisfactory, do they indicate potential issues or just need verification?





Enter AVSystem's Unified Device Management Platform

There is a growing trend among operators worldwide to outsource their infrastructure ownership and maintenance as well as collocation of services and variety of transmitters and core equipment types. Due to this trend, many telcos either already have lost or are in the process of losing the ability to acquire data that gives insight into the network performance, user behavior, usage characteristics and other key performance indicators. As a result, operators also lose a possibility of planning based on hard data and access to detailed support data.

With the unique capability of **extracting data directly from terminal devices**, AVSystem's UMP not only returns those capabilities back to the operators but also **extends** them substantially. The detailed network monitoring based on data acquired from end terminals properly aggregated based on multiple criteria gives the operator **unprecedented awareness about both current as well as historical network state.** Indicators such as network structure, services, user type or type of hardware used for the service delivery can easily be used as grouping criteria for data aggregation.

AVSystem's UMP includes **multiple** features addressing the needs of shared infrastructure users. By its extreme capabilities to collect the data from the enduser DSL devices, UMP is capable to deliver most **satisfying data about shared infrastructure** for the over-the-top service providers. By tuning data processing, the operator is able to determine the status of – for example – DSLAM as-aservice in a quick, convenient & efficient manner without accessing the underlying infrastructure or third-party interfaces.

Below there are features helping in achieving the ultimate goal of having a report about shared infrastructure behavior at any point-in-time or period.

Foreign infrastructure grouping and monitoring

As soon as the service is configured, end-user device is automatically assigned a respective DSLAM ID and becomes included in DSLAM/MSAN monitoring group. UMP automatically maintains groups of devices connected to a specific DSLAM using any dedicated parameter, which may reuse any existing operator's DSLAM identifiers convention. Even though this case study is related to DSL and uses the DSL-related naming accordingly, such an approach is also utilized for any other last-mile termination device – such as OLTs, CMTS etc.

Grouping of devices is dynamic, therefore devices are moved to different DSLAM groups according to information which is constantly being updated. Monitoring automatically follows such changes and adds a device to the appropriate DSLAM group. Such a method ensures all devices physically attached to particular DSLAM are always a part of an appropriate group related to this DSLAM. At the same time, a structure enabling monitoring, data aggregation and batch KPI calculation is provided.

At a predefined interval, **UMP will retrieve and store all relevant parameters available** in the end-user devices. Based on the device grouping, devices being a part of operator's own and shared infrastructure can be easily distinguished. Next, such a recognition system can utilize any of extracted data for calculating the KPIs of other single-device or grouprelated metrics.





Foreign infrastructure visualization & mapping

AVSystem's UMP includes a **built-in geo-visualization engine** allowing for a geographical display of any group-related KPIs. As a device typically belongs not only to a DSLAM group but also to many other groups, virtually, an endless combination of presentation is possible:

- Showing all devices depending on the technology used: DSL, Fiber, wireless, etc.
- Showing devices belonging to a certain operator.
- Showing devices belonging to a certain operator AND depending on the technology used: DSL, Fiber, wireless, etc.
- Showing devices belonging to a certain operator AND depending on the technology used: DSL, Fiber, wireless, etc. AND having a certain monitoring template assigned.



Current status in the embedded Customer Care module

When a Customer Care agents answer a call, they need to provide the end-users with specific answers and need to have such answers immediately – not within minutes or hours. UMP delivers exactly such data. Not only current detailed monitoring statistics are provided for the CC agent in the interface, but also additional info related to DSLAM grouping, such as:

- Which infrastructure the end-user is connected to: own or shared one.
- ID of DSLAM the device is connected to.
- If a device is online now: including the "Check if Device is Online" button.
- What is the status of other devices connected to the same DSLAM right now, with the ability to filter these devices out.





Foreign infrastructure's Key Performance Indexes reporting and calculations

UMP embedded reporting system provides all the data gathered through the service monitoring. All data can be aggregated, recalculated and exported for further processing.

Raw data is also available, both through the user interface or directly from the database. Example of out-of-the-box key performance indices include:

- System's availability for the operator / DSLAM / any other defined group.
- Average/min/max device link utilization.
- FEC errors per X MB of transferred data on Uplink/Downlink/Total.
- CRC errors per X MB of transferred data on Uplink/Downlink/Total.
- Statistics of link utilization per link type / nominal bandwidth / operator.
- Mean Time Between Link Retrains.
- Mean Time Between CRC Errors.

All these KPIs can be calculated per 1 device, per DSLAM as well as per desired groups of DSLAMs.

If requested, AVSystem can build an additional custom report recalculating data in any desired way and generating any KPI using the below mentioned data or the data indicated by Operator. In a typical environment, the DSL & Link Consumption monitoring parameters listed on the following page can be used in KPI calculations:



DSL Monitoring

- ConnectionStatus DownstreamAttenuation DownstreamCurrRate DownstreamMaxRate DownstreamNoiseMargin DownstreamPower UpstreamAttenuation UpstreamCurrRate UpstreamMaxRate
- UpstreamNoiseMargin UpstreamPower ModulationType LineEncoding PPPUsername ConnectionUptime ExternalIPAddress LinkEncapsulationUsed
- LastConnectionError DataPath INTLVDEPTH InterleaveDepth FECErrors CRCErrors LinkRetrains

Link Consumption

BytesReceived BytesSent DownloadRate UploadRate DownstreamUtilization UpstreamUtilization NonIdleDownloadRate NonIdleUploadRate



Summary

AVSystem's UMP is a complete solution for **data gathering, processing, presentation and reporting** necessary for the owner's infrastructure monitoring, using metrics & key performance indicators of the selected shared hardware.

For the operators with an outsourced infrastructure, it not only returns, but also **increases** the ability to see what really happens inside the network. In the era of mobility and mobile data access, such capabilities are **invaluable** for the network planning and its optimization.

Introduction of the remote access for the purposes of support and automatic service provisioning actions **decreases the customer support phone call time by 30-80%** (depending on the type of issues experienced by end-users), as well as overall number of calls related to initial installation issues by 60-70%.

This allows for larger investments into the network itself, infrastructure and service portfolio development, while the unique design of UMP allows for a seamless cooperation with a multitude of equipment used in the present days' and future networks.





www.avsystem.com

sales@avsystem.com +48 12 619 47 00

ul. Radzikowskiego 47d 31-315 Kraków