

Monitor - Analyse - Solve

Data probing solution on Gn & Gp-interface

Real-time visibility on mobile data performance

Fast deployment, easy-to-use, cost-effective



A different approach towards network monitoring

**Supporting your Packet-switched & Core Network
Operations, NMC/NOC, Customer Care, Legal, Product &
Service Management, Network Quality teams**

Full inbound & outbound roaming support

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Introduction

A different approach towards effective network monitoring

DataMon offers mobile operators visibility on the performance of its data network and services.

DataMon is a data monitoring solution for the Gn and Gp interface. All control plane traffic for all data users is captured and processed in real-time 24x7.

DataMon focuses on detecting **operational** performance problems in your network, in **real-time**. It provides you with relevant information to detect root causes of problems and to resolve those problems efficiently. Problems can be reported at different levels, such as individual APN, SGSN, GGSN, mobile subscriber, phone or data card type, roaming partner (inbound & outbound) and possibly also cell or radio technology.

DataMon offers functionality for different teams including packet-switched core network operations & engineering, customer service, network management/operations centre, product/service management, network quality, etc. A common source of information for all your teams, presented in an easy-to-use user interface increases the effectiveness of your teams significantly.

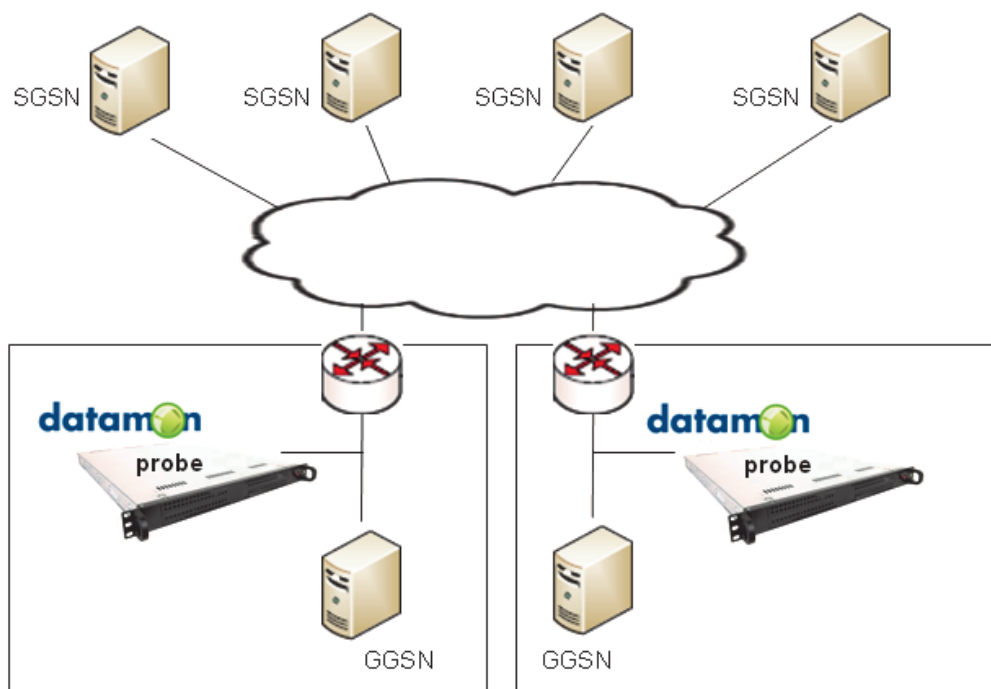
DataMon is a very **cost-effective** solution that can be deployed quickly. It combines ease-of-use with real-time performance and effectiveness.

System architecture

DataMon probes are typically deployed at the GGSN side of the Gn-interface. The DataMon probes can also be connected to the Gp-interface to capture all your roaming traffic (both inbound and outbound).

DataMon probes capture and process data in real-time but also contain the necessary databases and run the different DataMon applications. This distributed architecture reduces the need for extra servers and facilitates deployment. A DataMon system can be up and running in a few days.

Thanks to its distributed, peer-to-peer architecture a DataMon system can be easily scaled, new GGSN sites can be added with minimal effort, system maintenance becomes very easy and operation cost is kept low.



Control plane analysis

Principle

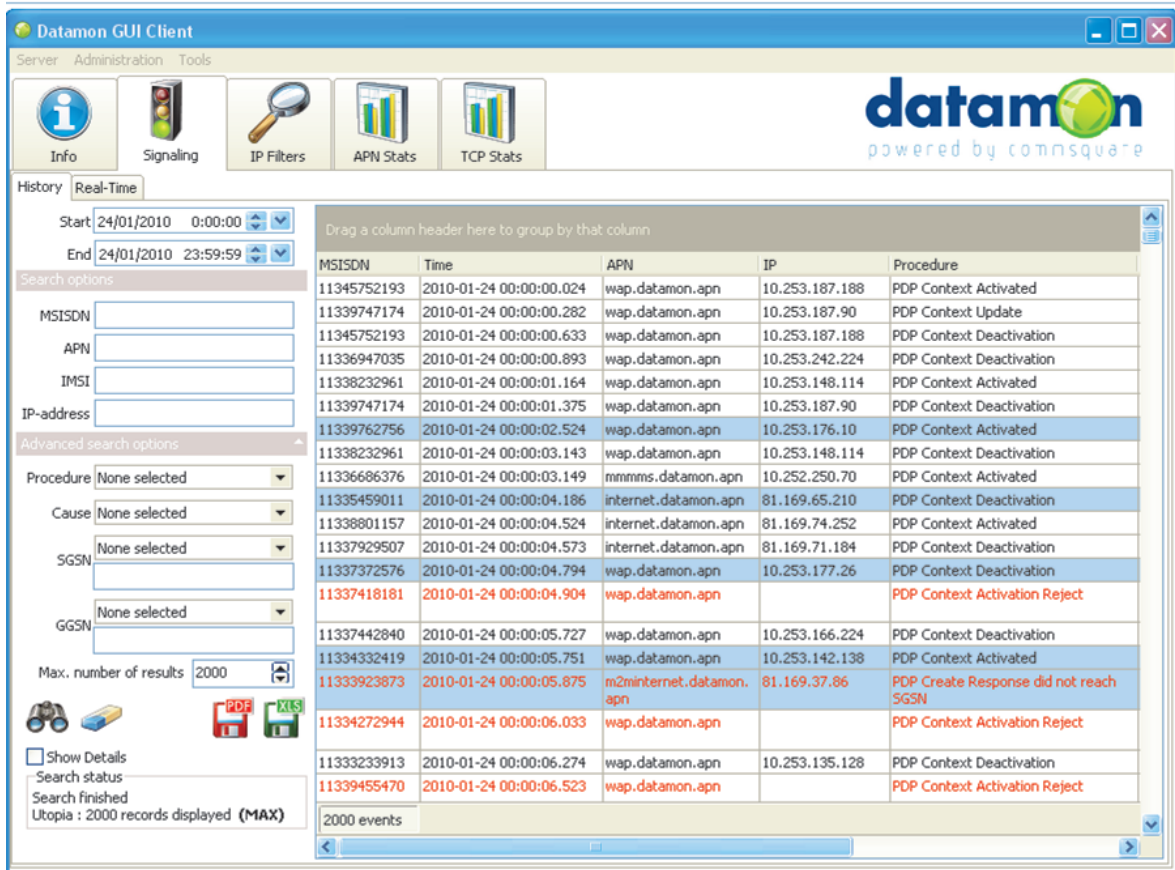
Each DataMon probe has a built-in state machine and creates a record for each signalling procedure in real-time. This information is made available in 4 different ways:

- Signalling procedures, history view
- Signalling procedures, real-time view
- Signalling statistics, history view
- Signalling statistics, real-time (“dashboard”)

Signalling history view

Signalling “history” refers to all procedures that have taken place in the past, e.g. 1 second or 1 day ago. There is no delay in DataMon of e.g. 5 or 15 minutes when referring to historical signalling information.

Information is colour-coded, e.g. different colours are applied for rejects and for roaming.



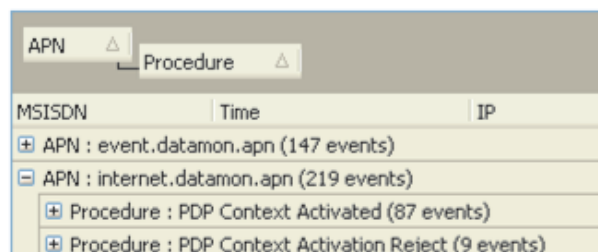
MSISDN	Time	APN	IP	Procedure
11345752193	2010-01-24 00:00:00.024	wap.datamon.apn	10.253.187.188	PDP Context Activated
11339747174	2010-01-24 00:00:00.282	wap.datamon.apn	10.253.187.90	PDP Context Update
11345752193	2010-01-24 00:00:00.633	wap.datamon.apn	10.253.187.188	PDP Context Deactivation
11336947035	2010-01-24 00:00:00.893	wap.datamon.apn	10.253.242.224	PDP Context Deactivation
11338232961	2010-01-24 00:00:01.164	wap.datamon.apn	10.253.148.114	PDP Context Activated
11339747174	2010-01-24 00:00:01.375	wap.datamon.apn	10.253.187.90	PDP Context Deactivation
11339762756	2010-01-24 00:00:02.524	wap.datamon.apn	10.253.176.10	PDP Context Activated
11338232961	2010-01-24 00:00:03.143	wap.datamon.apn	10.253.148.114	PDP Context Deactivation
11336686376	2010-01-24 00:00:03.149	mmms.datamon.apn	10.252.250.70	PDP Context Activated
11335459011	2010-01-24 00:00:04.186	internet.datamon.apn	81.169.65.210	PDP Context Deactivation
11338801157	2010-01-24 00:00:04.524	internet.datamon.apn	81.169.74.252	PDP Context Activated
11337929507	2010-01-24 00:00:04.573	internet.datamon.apn	81.169.71.184	PDP Context Deactivation
11337372576	2010-01-24 00:00:04.794	wap.datamon.apn	10.253.177.26	PDP Context Deactivation
11337418181	2010-01-24 00:00:04.904	wap.datamon.apn		PDP Context Activation Reject
11337442840	2010-01-24 00:00:05.727	wap.datamon.apn	10.253.166.224	PDP Context Deactivation
11334332419	2010-01-24 00:00:05.751	wap.datamon.apn	10.253.142.138	PDP Context Activated
11333923873	2010-01-24 00:00:05.875	m2mineternet.datamon.apn	81.169.37.86	PDP Create Response did not reach SGSN
11334272944	2010-01-24 00:00:06.033	wap.datamon.apn		PDP Context Activation Reject
11333233913	2010-01-24 00:00:06.274	wap.datamon.apn	10.253.135.128	PDP Context Deactivation
11339455470	2010-01-24 00:00:06.523	wap.datamon.apn		PDP Context Activation Reject

When retrieving signalling history, different filters can be applied, such as MSISDN, APN, etc. Further filtering can be applied on type of procedure, error cause, roaming traffic, etc. Retrieving signalling history information based on user identity (MSISDN, IMSI) is often used by Customer Service Agents.

Results can be easily exported to MS Excel or to PDF format.

The user interface contains a flexible and easy-to-use drag & drop mechanism to group information.

This feature is typically used when engineers are trouble shooting a problem.



Control plane analysis

Signalling real-time view

The real-time signalling view has the same filtering mechanisms as the signalling history view (i.e. by MSISDN, APN, procedure, etc.).

There is virtually no delay between completion of the procedure and the visualisation of the procedure in the user interface (delay substantially less than 1s).

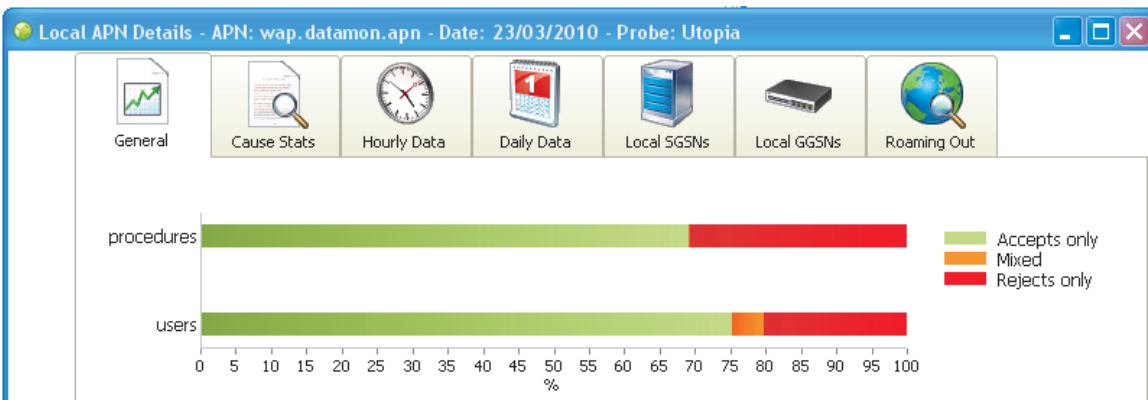
Probe	MSISDN	Time	APN	IP	Procedure	Duration (s)
Utopia	11335920970	2010-03-24 09:36:29.327	wap.datamon.apn	10.253.137.27	PDP Context Deactivation	149.019
Utopia	11336552408	2010-03-24 09:36:33.273	wap.datamon.apn		PDP Context Activation Reject	
Utopia	11335212041	2010-03-24 09:36:34.433	wap.datamon.apn	10.253.174.109	PDP Context Deactivation	882.625
Utopia	11336797812	2010-03-24 09:36:37.694	wap.datamon.apn	10.253.146.167	PDP Context Activated	
Utopia	11334644361	2010-03-24 09:36:37.926	wap.datamon.apn		PDP Context Activation Reject	

The real-time functionality is typically used by Customer Service Agents (filtering on user identity) or by operational teams (e.g. filtering on APN when creating a new APN, when migrating an APN, when making update, when fixing problems, etc.)

Signalling statistics (history view)

The signalling statistics calculate PDP success rates counted by (1) number of procedures and (2) number of unique users.

Counting the number of procedures is important to understand the signalling load. As far as the customer impact is concerned though, counting the number of failed procedures is misleading as some mobiles are known to produce a failure every 10-60s. Hence counting the number of **unique users** is important to quantify the number of users impacted by poor network performance.



DataMon classifies the performance for unique users as (1) users with only successful PDPs, (2) users with both unsuccessful and successful PDPs, and (3) users with only unsuccessful PDPs. The second category is interesting in particular. Its variation during the day often indicates a bottleneck in the network.

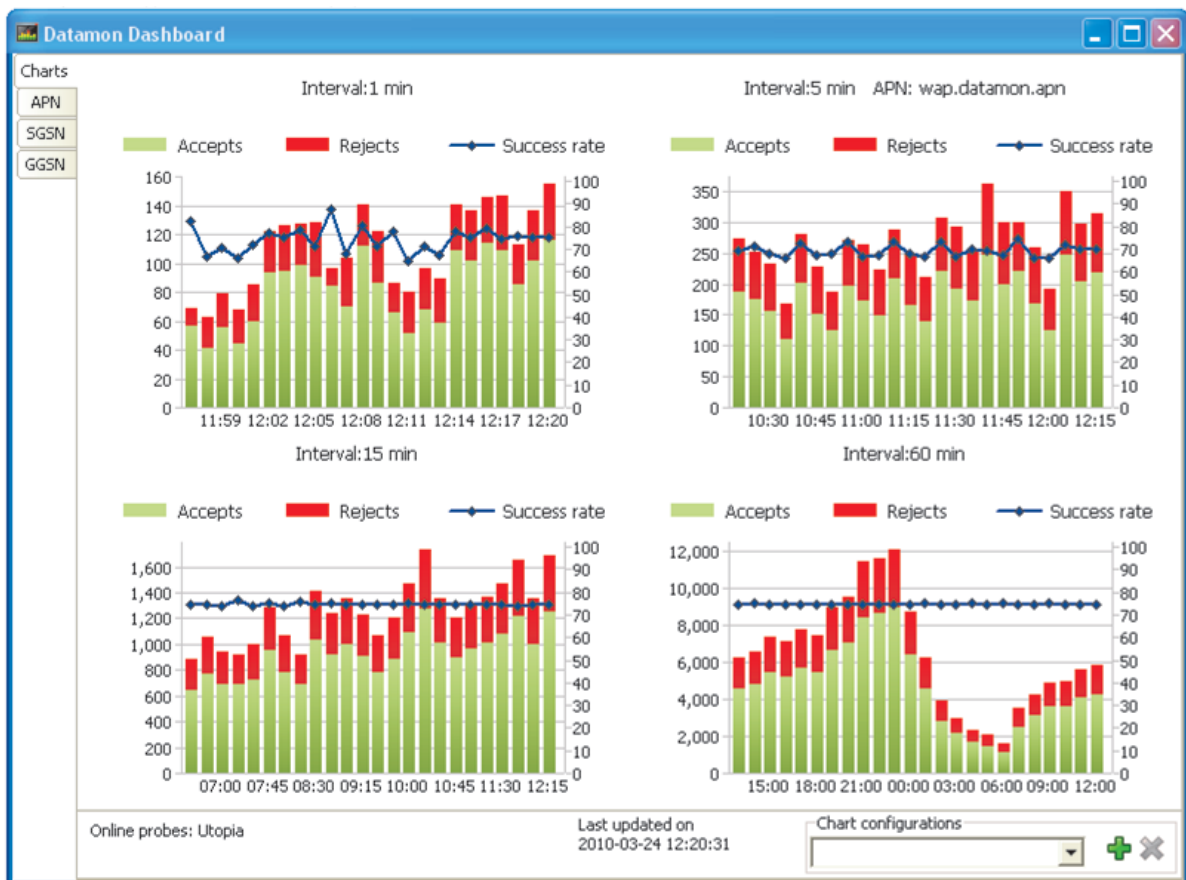


Dashboard (signalling)

Dashboard: signalling statistics, real-time view

DataMon has strong real-time capabilities. The dashboard view contains 4 charts with statistics on PDP success rate.

The dashboard is fully configurable. PDP activation success rates can be visualised for different APNs, SGSNs, GGSNs, countries and inbound or outbound roaming partners. The update frequency is configurable for individual charts and ranges from 1 to 60 minutes. Dashboard configurations can be saved and shared with other DataMon users. One user can open multiple dashboard views.



The dashboard also contains a table view of results so as to quickly identify problems in the network (impacting on APN, a GGSN or a SGSN)

Datamon Dashboard					
Charts		APN Statistics of last 5 minutes			Last updated on
APN		12:25 - 12:30			2010-03-24 12:33:51
SGSN					
GGSN					
APN	Success	Attempts	Success	Failure	
m2minternet.datamon.apn	52.2 %	23	12	11	
wap.datamon.apn	69.1 %	401	277	124	
internet.datamon.apn	81.3 %	80	65	15	

Dashboards are typically used by the Network Operations Centre (e.g. the top 4 APNs updated every 5 minutes); by product & service managers (e.g. for a specific APN such as MMS updated every 1, 5, 15 and 60 minutes); by packet-switched operations engineers (e.g. when creating a new APN; when upgrading an SGSN; etc.); by roaming managers (e.g. monitoring important or new roaming partners); etc.

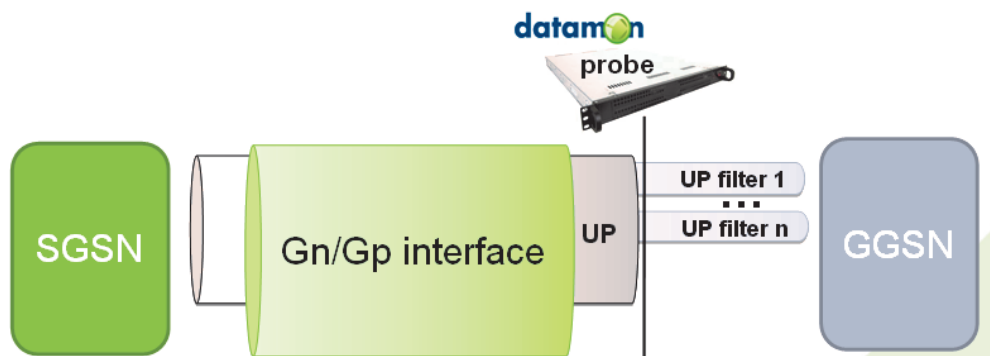
User plane filters

Approach

Commsquare has taken the strategic decision not to capture all user-plane traffic all the time. It is our experience that the success factors for resolving operational issues in mobile data networks are rarely lying in the capture of *all* user-plane IP traffic. From an operational trouble shooting point of view, capturing all user-plane traffic all the time only adds limited extra value at the expense of a dramatic increase in the total cost of the probing solution.

On-demand user-plane capturing

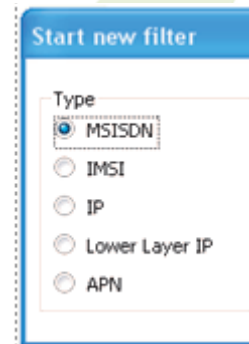
DataMon has a flexible and easy-to-use mechanism to capture a subset of the user-plane IP traffic in real-time and on-demand. Real-time filters can be created on MSISDN, IMSI, IP, etc.



DataMon captures user plane (IP) traffic on-demand and in real time.

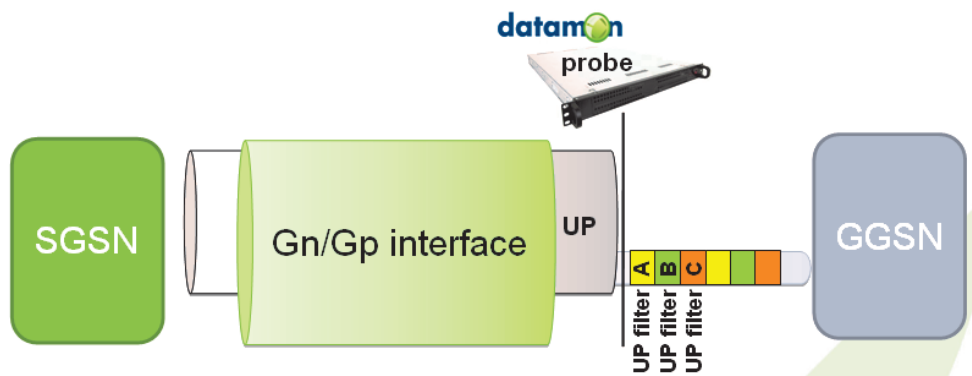
Captured data is saved in libpcap format and can be processed with standard tools (such as WireShark). Capture files are available in real-time and can be opened and analysed even when the capture is not complete yet.

Capture filters can be defined based on user identity, such as MSISDN or IMSI. Further, capture filters can be based on user IP address, server IP address or network element IP address (SGSN, GGSN). User plane sampling of APN traffic is another option.



Scheduled user-plane filters

DataMon offers the possibility to monitor the IP performance of a number of servers. The concept is time-sliced filtering, e.g. 12 servers can be monitored in one filter, with 5 minute intervals per server per hour.



SNMP Alarms

SNMP based alarms are useful to further strengthen the real-time aspect of DataMon, to ease its integration within the operator's network and to facilitate the detection of operational problems.

These alarms are fully customizable:

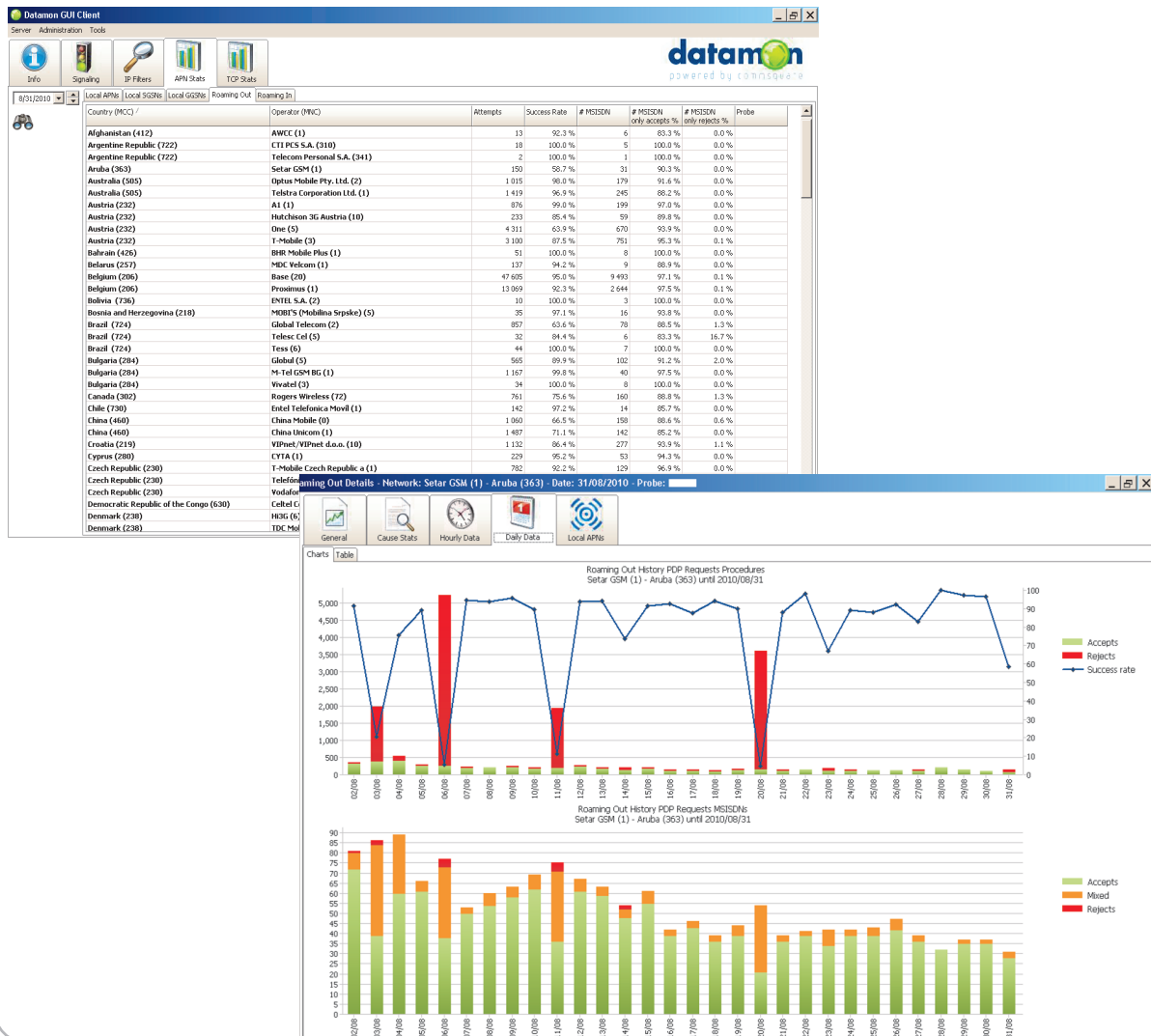
- Time window (1- 5-10-15-...minutes)
- Alarm when success rate drops below configurable threshold
- Alarm when no traffic detected
- Per APN
- Per roaming partner or country (roaming in or roaming out)

These alarms will also become visible as a new tab in the real-time dashboard.

Roaming

DataMon provides detailed PDP setup statistics per operator, both for roaming-in and for roaming-out. As roaming revenues are important, these statistics help to very easily identify problems with roaming partners.

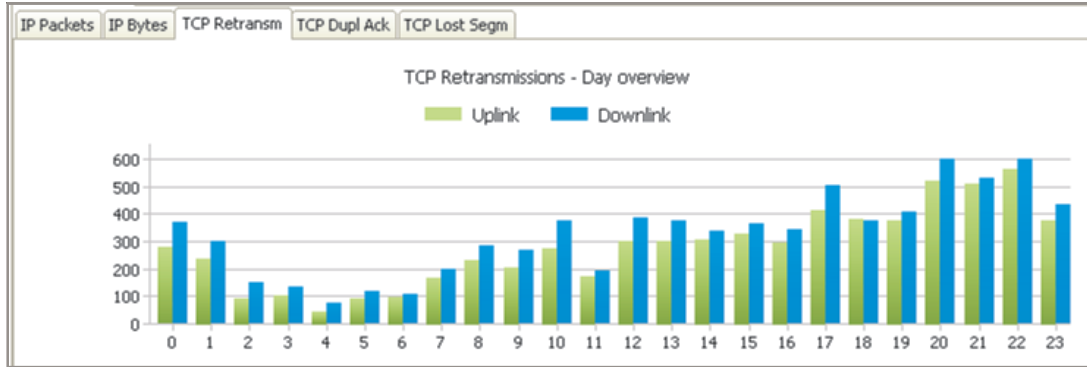
They also provide a quick overview of the trend of the number of users and amount of activity per roaming partner.



User plane filters

Scheduled user-plane filters (cont'd)

The IP monitoring of servers can be used for performance verification at IP and TCP level.




User management

User rights

User management and access rights are important to protect privacy of your subscribers. The DataMon system administrator can define different user profiles with different access rights. These profiles are then assigned to individual users.

Profiles



Profile	Signalling	IP Filters	APN Statistics	TCP Statistics	Dashboard	User Management	Network Config	Information Msg Config
Administrator (system)	✓	✓	✓	✓	✓	✓	✓	✓
ProfTest	✓	✓	✓	✓	✓	✗	✗	✗
customer service	✓	✗	✗	✗	✓	✗	✗	✗

User activity logging

Also for reasons of privacy, all user activity on DataMon is logged and stored in a database.

This logging contains detailed information on all DataMon user actions, such as details of queries run; who created what filters when; who downloaded what user plane traces when; etc.

DNS analysis

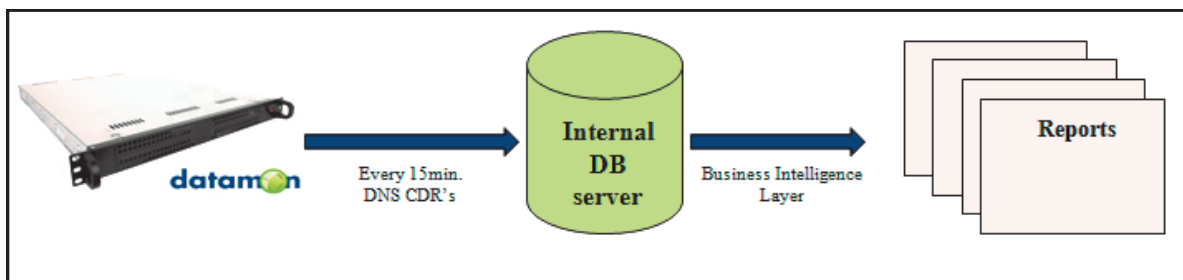
DNS Module

A DNS Module can be activated to analyze the DNS lookups. These DNS lookups can be;

- RAC/LAC lookups
- APN lookups
- User plane DNS lookups

The output is a file that is being updated every 15 minutes with CDRs containing all relevant data concerning these DNS lookup:

- Response code
- Response time
- DNS Server IP
- Client IP
- DNS name that is looked up
- ...



Specific feature

Machine-to-Machine

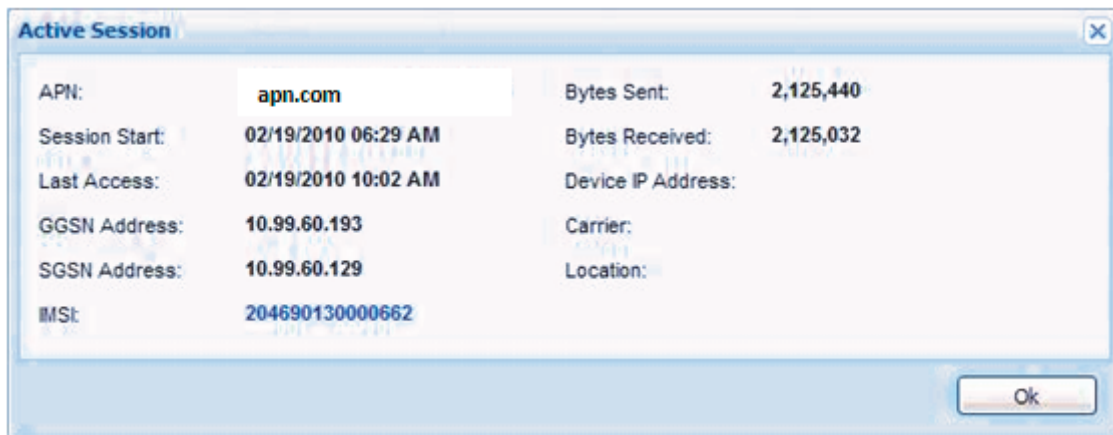
DataMon has an application that is aimed at machine-to-machine communications. Based on the user's identity (IMSI), session information can be retrieved. The following information is available (and could be extended further):

- Status session: active or not-active (PDP exists or not)
- APN
- IP address of session
- Session start & end time
- Time of last access, i.e. of last transfer of user plane data
- Number of bytes transferred and received
- Number of packets transferred and received
- GGSN & SGSN address
- Name of roaming network & country

DataMon has an easy-to-use API to retrieve the information above.

The API is based on HTTP GET and HTTP RESPONSE commands.

The API allows m2m providers to integrate the information in their own OSS. An example is depicted below.



Business benefits for multiple teams

One tool, multiple teams

A unique feature of DataMon is the fact that one tool and data source can be used by multiple teams. All your teams will have the same understanding of the network and services operational health.

Customer Services

Thanks to its unique **ease of use**, customer complaints can be resolved in real-time and require less technical expertise, while having the user on the phone.

DataMon customers testify that the number of Customer Trouble Tickets that needs resolution by scarce and expensive network engineers dropped by 80% thanks to the adoption of DataMon by Customer Service Agents.



Network Operations Centre

The dashboard is an easy way to monitor the operational health of your mobile data network and services. Performance is typically monitored at service level (APN), network element level (SGSN, GGSN) or for specific roaming partners.

Packet-switched Engineering & Operations

By drilling down in the data and taking on-demand user plane traces, data experts can resolve problems identified by the first and second line support teams.

RAN and Quality Team

DataMon is a complement to end-to-end and radio testing. When user plane traces are activated on test mobiles, DataMon adds an extra measurement point in your network. It will help clarify whether end-to-end problems are caused in the radio sub-system, on the core network/server side or in the protocol stack/application part.

Other teams

Other teams using DataMon are: product & service managers; roaming teams; lawful intercept; etc.

DataMon benefits

Intuitive and easy to use: different teams will find the information they need, presented in a way that requires not extra tools or technical training.

Quick and easy deployment: a DataMon solution can be deployed and made operational in a few days.

Cost-effective: the total cost of ownership of DataMon is a fraction of other tools.

Focus: DataMon has a limited but focused set of features. All features are based on proven needs in live network environments.

Real-time: DataMon has a strong real-time aspect demanded by customer service and operational teams.

Trial in your network

Trial in your network?

Please contact us to discuss a trial in your network. We have a **special trial program** including support for problem solving and knowledge transfer from Commsquare experts. No extensive training is needed, the tool is swiftly implemented and accessible for multiple teams in less than a day.

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