

## SeaDataNet network monitoring services: Features and Statistics

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SeaDataNet (SDN) is a standardized system for managing the large and diverse data sets collected by the oceanographic fleets and the automatic observation systems. The SeaDataNet infrastructure network currently includes national oceanographic data centres of 35 countries, active in data collection. The networking of these professional data centres, in a unique virtual data management system provide integrated data sets of standardized quality on-line. As a research infrastructure, SeaDataNet contributes to build research excellence in Europe and in order to fulfill that it needs to be constantly monitored.

Network monitoring is the use of a system that constantly monitors a computer network for slow or failing components and that notifies the network administrator in case of outages. SeaDataNet has implemented the SDN network monitoring System that monitors the SDN services (web pages, Download Managers, etc.) through Internet to confirm that they are accessible and available, notifies persons in charge to take action in case of service failure and keeps statistics.

The SeaDataNet monitoring plan was divided into nine phases. Firstly, the appropriate software that was going to be used as a base for further development was selected and then a pilot group of partners was set up to test the software. So, the first services were added to the system and the first monitoring data were examined. Plugins were developed (Download Manager plugin) and/or added to the software to improve its functionality. The rest of the partners' local services (Download Managers) were then added gradually to the monitoring system.

A user friendly interface for the local administrators (partners whose services were being monitored) has been developed that uses the SDN CAS authentication system and many features for reporting monitoring results such as service uptime for a selected time period, reports of critical events, histograms, trends and handling of scheduled downtime events. The last implemented feature was the Global Availability Indicator, a percentage value that shows the whole network's uptime for a user-defined period of time.

To improve the reliability of the SDN monitoring system, a false alarm detection system was developed. For this purpose, a second monitoring system that constantly monitors the SDN services was installed and configured. In cases of outages the main monitoring system crosschecks the alarms with the second system then decides if the alarm is true or false and sends notification emails to the local administrators.

The SDN network monitoring system currently monitors 160 services derived from 7 services groups and keeps their statistics. The Global Availability Indicator for the last reported period (September 2014-September 2015) was 99.14% and the average uptime for the SDN Download Managers was estimated to be 98.19%. The above results prove that the SDN Monitoring Systems ensures the SeaDataNet infrastructure's well operability and sustainability which means that all its services are available and accessible by the end-user (scientists, students, data analysts, etc.). The SDN monitoring system will constantly improve to meet the new and forthcoming needs.