



MEOS™ Connect

Ground Stations Networking made easy

MEOS™ Connect is a basic building block for implementing efficient monitoring & control infrastructures in distributed Ground Station environments

Problems adressed

Masking the complexity and implementation of control systems is critical for providing interface flexibility and a consistent monitoring and control architecture. The individual system components must be accessible for commanding and component status retrieval, through a unified, well defined interface. In addition flexible mechanisms allowing efficient access to system configuration, historical status, events, alarms and scheduled activities are needed.

Operational Modes

The primary mode of operation is to have *MEOS Connect* reside locally on each physical system node hosting the sub-systems. In this mode it is accessed directly from the central control system or operator MMI, with no intermediate links. This is suitable for ground station infrastructures having few physical nodes.

In system architectures with a larger number of nodes, centralized access to all subsystems may yield an unnecessarily complex architecture. *MEOS Connect* concept allows *MEOS Connect* instances to be inserted as intermediate links, creating a single access point to sets of nodes. E.g. one *MEOS Connect* box per acquisition site. The resulting monitoring and control hierarchy inherently allows virtually limitless system scalability and flexibility. The databases hosted by central nodes of the hierarchy are automatically populated and synchronised with those at lower levels.

Key features

- Open architecture allowing easy upgrading
- Monitoring and control of any number of ground station software components, at different system levels
- Provides system- and sub-system access through well defined, local or distributed *MEOS Connect* access points
- Monitoring based on status subscription using XML based, asynchronous messaging
- Built-in mechanisms for global monitoring of individual components, providing powerful alarm definition capabilities
- Historical status data kept in an SQL database, e.g. PostgreSQL - a number of access tools is available
- Automatic synchronisation of *MEOS Connect* databases
- Reduces Monitoring and Control network traffic
- Access authentication, specific capabilities for each client
- MMI access to all functions from the GUI
- Conceptual support for any M&C system, by adding tailor made control system plugins
- Core *MEOS Connect* functions are dynamically replaceable by 3party functions, adaptable to future monitoring and control standards
- Distributed *MEOS Connect* boxes improve system scalability and allow efficient routing of sub-system commands and status
- Automatic *MEOS Connect* box failover (optional)

Benefits

- One single system wide monitoring mechanism made possible
- Integration with existing monitoring and control systems using tailored or 3rd party *MEOS Connect* plugins
- Particularly well suited for monitoring of data driven production chains
- Network bandwidth utilisation (only updated parameters sent), suitable for low performance, long haul networks
- *MEOS Connect* box concept allows scalable monitoring and control architectures through hierarcical structuring
- High availability through replication of the Monitoring and Control mechanism
- Full multi-mission support, allowing future missions to be added with minimum effort



Control System Integration

MEOS Connect interfaces to the control system residing on each node through tailored plug-in modules.

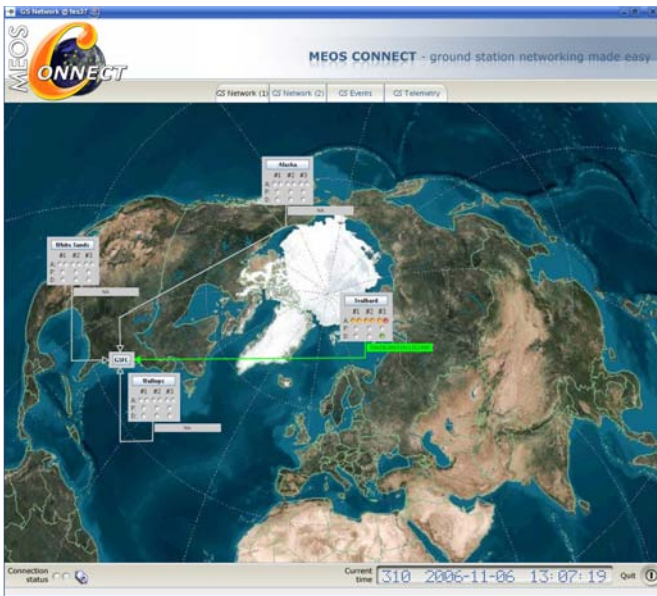
Connect Client Session Types

- User logon
- Subsystem/component configuration access
- Event monitoring and filtering
- Subsystem status
- Activity status and activity scheduling
- Alarms
- System/subsystem commanding

MMI Integration

The full capabilities of *MEOS Connect* can be utilized via the Java MCS GUI¹, or any other MMI supporting *MEOS Connect* interface.

¹) Accessible via a standard Web browser



Interface Examples

STATUS SUBSCRIPTION:

The subscribe message is used to start status reporting for one or more parameters. When a parameter is subscribed, status is reported whenever the value changes. Subscription example:

The client sends this message:

```
150
<subscribe>
  <param name="GSC.ACTRL.elevPos"/>
  <param name="GSC.ACTRL.aziStow"/>
  <param name="MTX.MTX_70_1.pl" type="config"/>
</subscribe>
```

The MC MEOS Connect sends asynchronous messages like this:

```
145
<status time="2004-05-25T18:10:53">
  <GSC>
    <ACTRL>
      <elevPos value="49"/>
      <aziStow value="2"/>
    </ACTRL>
  </GSC>
</status>
```

Note:
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Example systems

In principle *MEOS Connect* can be used in any distributed production system, at any scale. It is suitable for highly distributed production systems spanning across WANs, including systems requiring monitoring and control of entire facility- or centre components (e.g. complete processing suites). It is equally suited for smaller, single-LAN or single computer based systems.

MEOS Connect has been selected by NASA as a key component in the NASA EDOS data driven infrastructure for managing the production of Aura, Aqua, EO-1, Icesat and Terra originating at Alaska, Svalbard, Wallops and White Sands, controlled from Goddard Space Flight Center.

System Interfaces

Three types of clients supported: MMIs, other *MEOS Connect* instances, or 3party applications.

The data transfer methods and protocols supported include, but is not limited to: TCP/IP, and HTTP(S).

All Monitoring and Control flows are in XML format.

MEOS Connect is a message oriented server, based on asynchronous messaging.

System Performance

Scalability is a key property of *MEOS Connect*. When *MEOS Connect* Box is employed at strategic points of an architecture, the concept scales to any number of nodes.

MEOS Connect database disks can be sized according to specific needs.

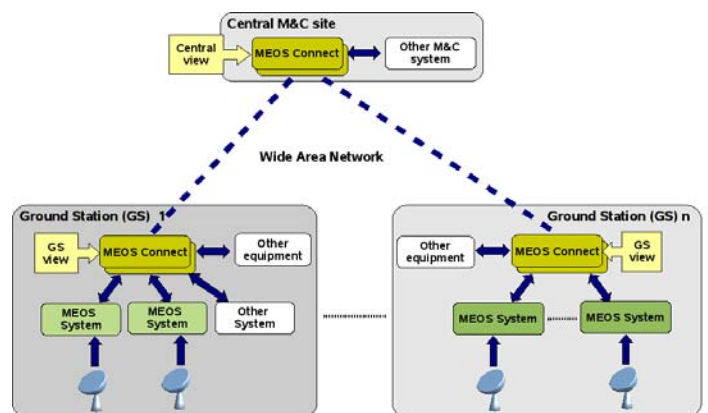
Network bandwidth requirements of the mechanism are at an absolute minimum, and depending on the number of nodes involved, it can run across as little as 64 kbps ISDN lines / any line supporting TCP IP.

Supported Platforms

Currently running on Debian, Red Hat and Suse Linux. Can be applied to most other Linux and Unix flavours.

No particular hardware requirements made.

Overall architecture



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