smart rings

OPTIMAL SOLUTION FOR PAYLOAD MANAGEMENT AND RECONFIGURATION
smart rings is GMV’s answer to managing the increasingly complex payloads of communications satellites. With a powerful reconfiguration algorithm and a superb visualization, smart rings provides operators with an essential tool to quickly and efficiently manage the entire payload configuration from receiver to transmit antennas.
RESPONDING TO MARKET DEMANDS

The upsurge and specialization of communication needs in our globalized world together with new services being rolled-out are shaping the satellite communication industry.

Satellite communications have evolved from fixed content, point-to-point communication to dynamic content, multipoint-to-multipoint communications. New band frequencies have also been incorporated and the spot-beam and multiple carrier approaches are increasingly being utilized.

These new satellite communication systems provide the possibility to utilize allocated spectrum much more efficiently, but are more complex and difficult to manage without the proper tools. Also, the increased payload flexibility has made it more difficult to configure payloads to respond to changing customer demands or critical payload components failures.

**smart rings** is GMV’s answer to satellite operators challenging demands for efficient management and quick reconfiguration of increasingly complex satellite communication payloads.

A STRONG INNOVATIVE SOLUTION

**smart rings** provides operators with the capability to manage the entire satellite communication payload. It is an extremely useful tool that allows payload engineers to quickly obtain the optimal reconfiguration of the satellite payload in case of changes in the transmission plan or in response to component failures and service interruptions.

**smart rings** can also be used as a powerful “what if” analysis tool. It is also a very valuable tool for training and in-orbit testing.

The core of **smart rings** is an advanced and efficient algorithm capable of solving reconfiguration problems for the most modern and complex communication payloads flying today.

**smart rings** is capable of finding all available payload reconfiguration solutions for a given problem. Each solution incorporates a series of characterization criteria (signal attenuation, number of switches a channel needs to cross, number of disturbed channels, etc.) and detailed relevant data (devices affected by the reconfiguration, channels affected by the reconfiguration, etc.) that allows the payload engineer to select the most efficient reconfiguration.

Another key feature of **smart rings** is its first-class usability. The tool features an intuitive GUI which includes innovative synoptic views (or mimics) for visualizing the resulting payload configurations and tabular and matrix views for presenting detailed data.

The GUI design allows the payload engineers to quickly access all the relevant data and easily analyze the different configurations proposed by the tool.

ON THE SPOT

**smart rings** can be easily integrated into your operational environment to perform the following tasks:

- Capture the current status of the payload devices from spacecraft telemetry
- Calculate solutions to quickly execute optimal reconfiguration of the satellite payload
- Generate configuration status and reconfiguration plan reports
- Directly ingest the generated command list into the operational real-time satellite control system
**MAIN FEATURES**

`smart rings` comes fully loaded with unique features:

- First class usability
- Powerful reconfiguration algorithm
- Quick payload reconfiguration solution turnaround
- Superb visualization
- Synoptic payload views for solutions
- Tabular views for detailed data
- Adaptability
- Custom built GUI for each payload
- Quick access to relevant data

On top of these features, `smart rings` is:

- Flight proven
- Easy to integrate into operational environment
- Easy to deploy
- Easy to operate and maintain

`smart rings` has:

- No ITAR constraints
- Flexible license policy

**smart rings ARCHITECTURE**

`smart rings` is made of a number of modules each one providing a useful number of capabilities.

- **Payload configuration capture module:** It downloads the payload TM from the real-time satellite monitoring and control system and generates the corresponding payload configuration. It can work either in online mode, acquiring TM from the real-time control system, or in offline mode, reading data from local files.

- **Payload reconfiguration module:** It computes all the reconfiguration solutions to an input configuration. The input configuration can be downloaded from TM, retrieved from the archive or modified manually by the user.

- **Payload reconfiguration telecommand generation and upload module:** This module generates a command list needed to implement the selected solution for payload reconfiguration and the associated detailed report. This command list may be uploaded to the real-time control system.

- **Payload configuration repository management module:** This module allows the user to retrieve previously saved configurations, save new configurations and import/export a configuration from/to a file.

**PAYLOAD COMPONENTS AND STATUS**

`smart rings` supports a wide variety of payload components including:

- Switches: R-switch, T-switch, C-switch
- TWTA's
- Linear Channel Amplifier
- Input and Output MUXes
- Combiners

Each of these components has an operational status that can be assigned independently to each component. The available statuses are:

- OK: the component can be used without any constraints.
- FAILED: the component is failed and cannot be used, regardless of status available in TM.
- RESERVED: the component cannot be used by the payload reconfiguration algorithm.
- STUCK: the component position cannot be changed due to a physical or operational constraint on that component.
- DEGRADED: the component is at its end of life so the reconfiguration algorithm cannot consider solutions requiring commands to be sent to that component.
smart rings BENEFITS

smart rings has been design with the user in mind to bring about real improvements and benefits.

Tackling payload complexity

Smart rings supports your engineering teams tackle reconfiguration problems for the most modern and complex satellite communication payloads. It is capable of finding all available payload reconfiguration solutions to changes in the transmission plan, component failures, ring interruptions and other situations allowing engineers to obtain optimal solutions that fit the operational constraints.

Quick payload reconfiguration turnaround - shorter service interruption

The efficient reconfiguration algorithm is capable of solving configuration problems and generating reliable solutions really fast. smart rings superior usability allows payload engineers to quickly access all the relevant data and easily analyze the different configurations proposed by the tool.

This means shorter service interruption and higher customer satisfaction.

In-orbit insurance

Having a proven payload reconfiguration tool that ensures all possible options for configuring a damaged payload may serve to lower the cost of in-orbit insurance.

Testing & training

Smart rings can be used as a powerful “what if” analysis tool for evaluating scenarios. It is also a valuable tool for staff training and for in-orbit testing.

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