

CYBERSECURITY, SPACE SERVICES AND TRANSPORTS

PREMESSA

Space Service can play an important role in transport systems and then represent an important role in Space Economy.

Earth Observation, Navigation and space communication applied within transportation systems can improve:

- Safety
- Autonomy
- Environmental and Economic sustainability

Large scale integration of space services in transport intersect important areas of innovation:

- Big Data
- Internet of Things
- Artificial Intelligence

Ubiquity of Space Services means also severe exposition of these system to cybercrime. This vulnerability now days is a practical obstacle at the use of Space Services in transport, and de facto limits their operational use. The growing interconnection of the informatics infrastructure, made space system command, control and data distribution a perfect pray for cybercrime.

In the following, we propose a large European Space Program devoted to reduce this menace.

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IL QUADRO DELLE TECNOLOGIE

All Space Services could play a strategic role in modernization of transportation system, but all of them are diversely exposed to cybercrime risk. On the other side an integrated approach on space service technology dramatically increase the the robustness of the others.

If we consider e.g. autonomous air vehicle in a cyberattack scenario we can have:

1. Disturbance of the air-satellite link
2. Jamming of the GNSS navigation signal
3. Corruption of acquired mission data

In scenario number 2, EO data information can supply independent position information producing alternate coordinates. In a similar way integrity of on board imaging data can be guaranteed by high resolution image provided by satellite.

With an holistic approach to security Space Service can, this way, increase resilience and robustness of any transport vehicle in air, on ground and over the sea.

IL RUOLO DI UNA FACILITY DI TEST

As noted is a must reproduce complex scenarios involving transport system utilizing integrated satellite services, that can simulate in a safe, controlled way threat and relatives countermeasure.

An example is the FAA Cybersecurity Test and Evaluation Facility deployed in support of the Next Gen Transportation System in USA.

The CyTF is a flexible and autonomus facility, that independently from the operation, enable research and test on security threats.

A similar infrastructure, extended to different transport system in confined scenario can:

- Test cybersecurity technologies before their operational use
- Robustness of single subsystem before their full integration
- End to end system test
- Simulation of complex attach scenarios
- The definition of optimal responses
- Education and Training of operators.

Part of this capabilities are actually under development at Grottaglie Test Bed, in southern Italy and Redu Space Communication Center, under a joint effort between ESA, ASI, Belspo and DTA (Apulia Areospace Cluster). This facility, that will involve others relevant infrastructure of the partners, will apply initially these concept to Remotly Piloted Aircraft.

CONCLUSIONI

An integrated approach to cyber risk mitigation should be part of a coordinated effort at continental level. As an example the Italian Space Economy plan, consider the support to Transportation a key issue in space system sustainability, but only a coordinated European program dedicated to SS cybersecurity for transport could made operational and safe SS for transport.

It's also sure that part of this effort should be a dedicated facility for realistic test in confined area, in our opinion the Grottaglie Test Bed is a strong candidate to this role in cooperation with other National and European facilities.