Facilitating the Standup of Small Satellite Ground Systems through the Use of Adaptive Software Standards

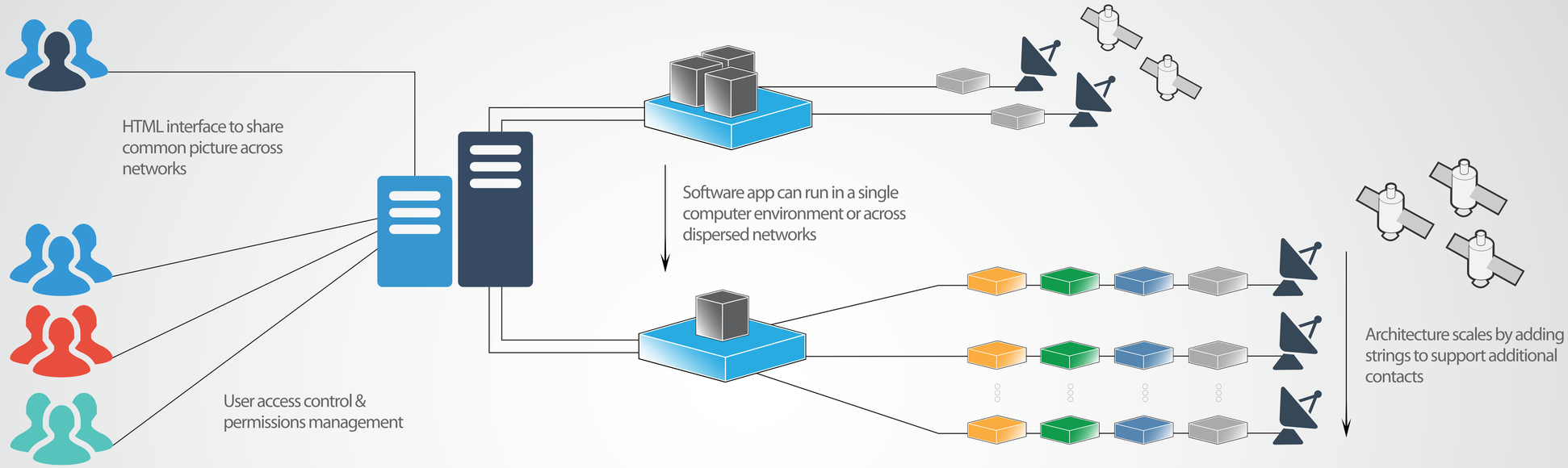

Figure 1: Typical quantumGND Architecture

GEMS

The Ground Equipment Monitoring Service (GEMS) standard creates an interface for ingesting telemetry, sending commands, and controlling ground system equipment. Interfaces to Front End Processors, Modems, AFSCN Interfaces and Antenna Control Units no longer need to be custom processes, but are available for use out-of-the-box using GEMS-compliant equipment. Using GEMS, new equipment can be readily adopted, tested and incorporated into the existing ground system.

Adaptive Standards

As part of a flexible ground system architecture, use of REST, XTCE and GEMS standards allow for operational capabilities in weeks instead of months or years, filling the Small Satellite need for shorter timetables compared to traditional architectures. Through the use of these standards, programs can focus on the development of payloads and mission unique applications instead of integration of ground system components.
Additionally, through the use of standard, web interfaces can be used to access the ground system, reducing the footprint of the ground hardware. Software applications can be used in place of traditional hardware solutions which lead to single or distributed environments or architectures. Finally, because software applications can be used, scaling ground systems to support additional contacts becomes much easier.

HTTP/REST

Representational State Transfer (REST) is an adaptive software architecture used in the development of higher-performing and more maintainable communications architectures. Leveraging common interfaces, REST allows an open, web-based approach to communicate with ground system equipment and satellite busses.

JSON/XML

JavaScript Object Notation (JSON) and XML are used for defining human-readable, structural data definitions. By utilizing these standards, Small Satellite missions can easily share and consume configuration files and produced mission data products without having to implement specialized processing routines.

XTCE (XML)

The XML Telemetric and Command Exchange (XTCE) standard is used for defining and sharing telemetry and command (T&C) data streams using Extensible Markup Language (XML). Through the use of XTCE, Small Satellite mission no longer rely on proprietary C2 databases or complex, negotiated Factory to Ground ICDs to share and store telemetry and commands. Use of the XTCE standard allows developers, operators and integrators the ability to construct and test their own satellite databases using unifying database formats across satellites and ground systems.

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