Network Gateway and Compute Server on an Aircraft

Product
Retrofit Naval and Military aircrafts with Survelliance, Compute and Communication system

Business
Designs, develops, builds and supports aircrafts, next-generation spacecrafts and cyber security

Product overview
Develop a distributed electronic system of sensors, processing boards, network, and satellite and ground modems. There are 14 types of sensors and the average download data is 1.2Gbps. The aircraft processes all the sensor data and generates commands. The download is a combination of commands and data such as media and map information. The goal is to maximize the sensing resolution for all sensors and minimize the latency between sensing and downstation reception.

Project Team Background
Network engineers

Project Challenges:
- Create a system solution to address the functional, dimension and performance constraints.
- Architect hardware, software, and network to meet cost at the required latency and throughput.
- Select the sensor resolution, sensor count, compute server configuration, network topology, storage capacity, downlink speed and storage requirements.
- Creating a prototype on a plane or in the Lab were both expensive and requires over 6 months.

Results:
- Performance requirements could not be met within the dimensional constraints.
- Generated a modified requirement that could be met the cost and weight constraint
- Project duration was 6 man-weeks

VisualSim Solution:
- Developed system model of the network of satellites, aircrafts, ground stations and vehicles.
- Modeled the hardware, RTOS and software and communication modems in the aircraft
- Communication network was modeled as Bit-error-rate and distance restricted.
- Sensors modeled as traffic generators, RTOS as scheduler and software as task flows with delay
- Dynamic Instantiation was used to define the number of system instances at run-time
- Visualsim library: Network, System Resource, Traffic, Task graph, RTOS, and fault analysis.