Statement of Work

NASA/GFSC/WFF

PR: 4200512871

Title: Range Data Acquisition Computer (RADAC) for NASA/Wallops Flight Facility

NASA/GSFC has a requirement for software and hardware upgrades to its Linux Range Data Acquisition Computer (x86 Linux RADAC) operated in the Wallops Range Control Center at Wallops Island, Virginia. This system provides real-time processing of flight vehicle performance data for the Goddard Space Flight Center (GSFC)/Wallops Flight Facility (WFF) Range Control Center (RCC) and at remote sites in the WFF Mobile Range Control vans.

NASA/GSFC intends to purchase the required items from Command and Control Technologies, Corp. These computer systems have been built and provided to NASA/WFF since 2007 with special customizations to meet range requirements.

No other vendor can provide this system and still guarantee the integrity of the system for Range Safety certification criteria. Using a different vendor will introduce unexpected hardware and software processing behavior that results in added risks to the Range Safety officers and other Control Center users. Each risk will require additional testing and data analyses in order to achieve re-certification and management approvals into Wallops operations.

Requirements to provide a RADAC system for NASA/WFF include:

Data Acquisition:

1. Computer shall acquire multiple Time-Space-Position-Information (TSPI) data packets from a maximum of eight NASA-managed radar tracking data sources transmitting during a typical NASA/Wallops range mission at 10Hz rate.
2. Computer shall demonstrate capability to acquire IRIG data format "Minimum Delay Data Format (MDDF)".
3. Computer shall demonstrate capability to acquire IRIG data format (Format 0A) "Launch Trajectory Acquisition System (LTAS)".
4. Computer shall demonstrate capability to acquire data packets using existing WFF serial (RS-232) modem interface (2400baud).
5. Computer shall demonstrate capability to acquire data packets using existing NASA/WFF data format and ethernet network interface.
6. Computer shall acquire countdown time using existing Wallops ASCII Time Code data format.
7. Computer shall apply a frame synchronization standard to each data form to allow validation of acquisition data.
8. Computer shall synchronize its internal clock to IRIG-B time service provided by a NASA range services.

Data Processing:

1. Computer shall de-commutate acquisition data packets and provide conversions to engineering unit measurements.
2. Computer shall demonstrate capability to apply a NASA-approved data edit and filter process to smooth raw data values.
3. Computer shall demonstrate capability to perform data transformation:
    a. Range-Azimuth-Elevation (RAE) to Present Position (Lat, Long)
    b. Range-Azimuth-Elevation (RAE) to Earth-Centered-Earth-Fixed (ECEF)
    c. Earth-Centered-Earth-Fixed (ECEF) to Present Position (Lat, Long)
4. Computer shall provide vehicle information including:
    a. Present Position
    b. Impact Prediction Position
    c. Altitude
    d. Velocity

Data Archive:

1. Computer shall demonstrate capability to save all acquisition data packets in their raw and post-processing formats.
2. Computer shall provide a data retrieval utility to collect data from an archive.
3. Computer shall demonstrate capability to automatically capture all mission configurations and associated data.
4. Computer shall provide a real-time utility to allow users to view and access raw and processed data during processing.
5. Computer shall provide at least 1TB of disk space storage.
6. Computer shall provide an internal tape drive for additional storage and backups.

Other:

1. Computer shall provide a utility that allow users to playback data as a simulated mission.
2. Computer shall demonstrate a capability to be user-configurable to accommodate Wallops range mission requirements.
3. Computer shall provide an Application Programming Interface (API) that allows NASA software developers to develop custom applications that interface directly with data acquisition and processing activities.
4. Computer shall provide documentation for a User's Manual.
5. Computer shall provide documentation for a Developer's Manual.
6. Computer shall be rack-mountable.