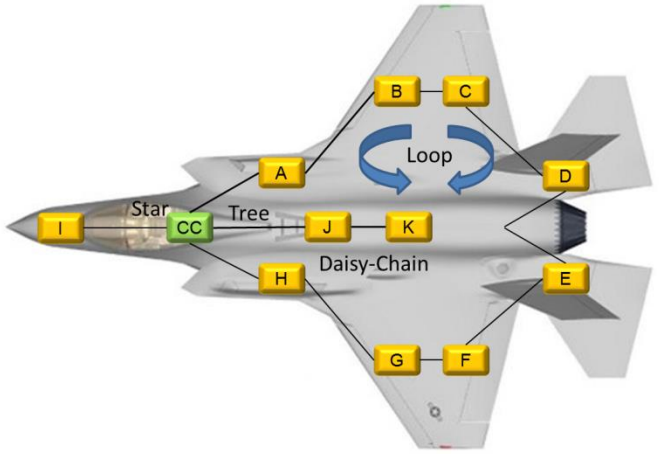
AS5643/IEEE-1394b

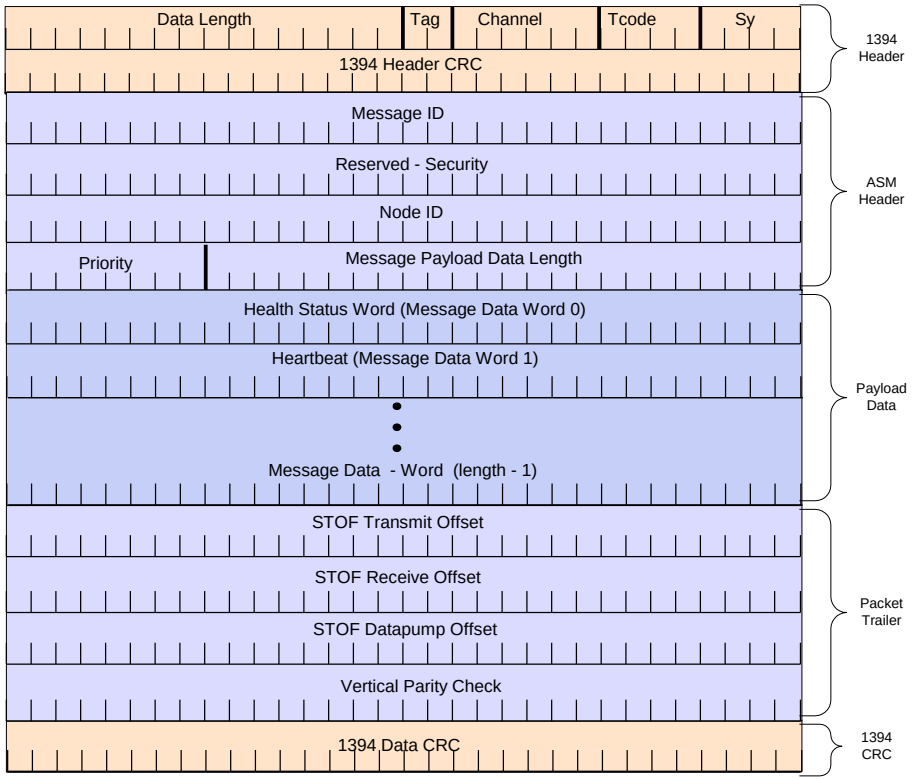
Deliver Flexible Deterministic Solution for Aerospace and Defense Applications

SAE International®

Snapshot View

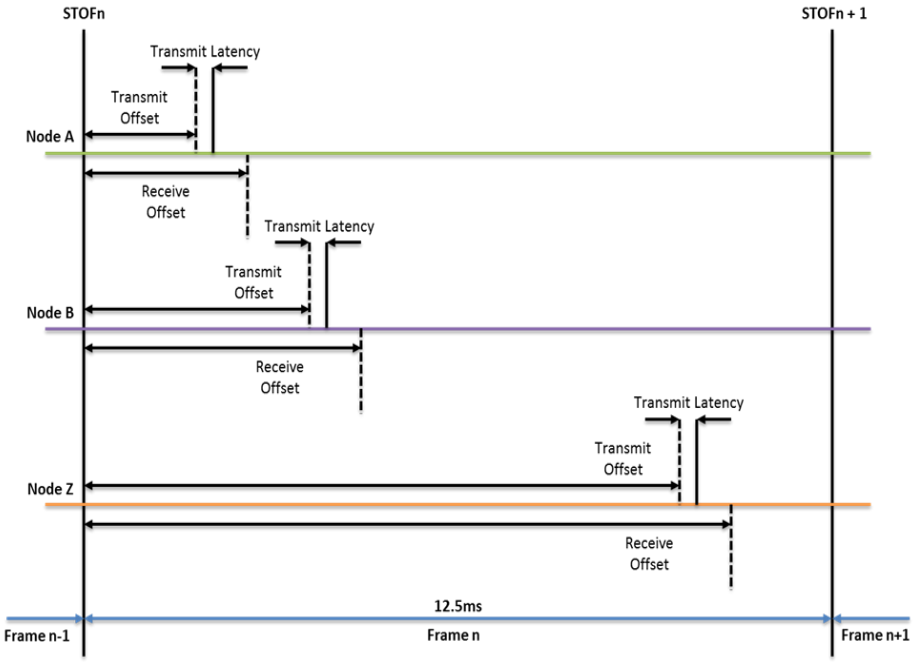


- SAE Standard AS5643 together with IEEE-1394b provide the interface requirements for Military and Aerospace Vehicle applications
- 1394b is a high speed serial bus capable of 122Mbit/s (S100) to 3.92Gbit/s data rates on a network consisting of daisy-chained, starred, treed and looped topologies and supports copper and fiber optic wiring
- Asynchronous stream packets are used to send Anonymous Subscriber Messages
- Pre-assigned addressing and bandwidth insure deterministic operation and high reliability



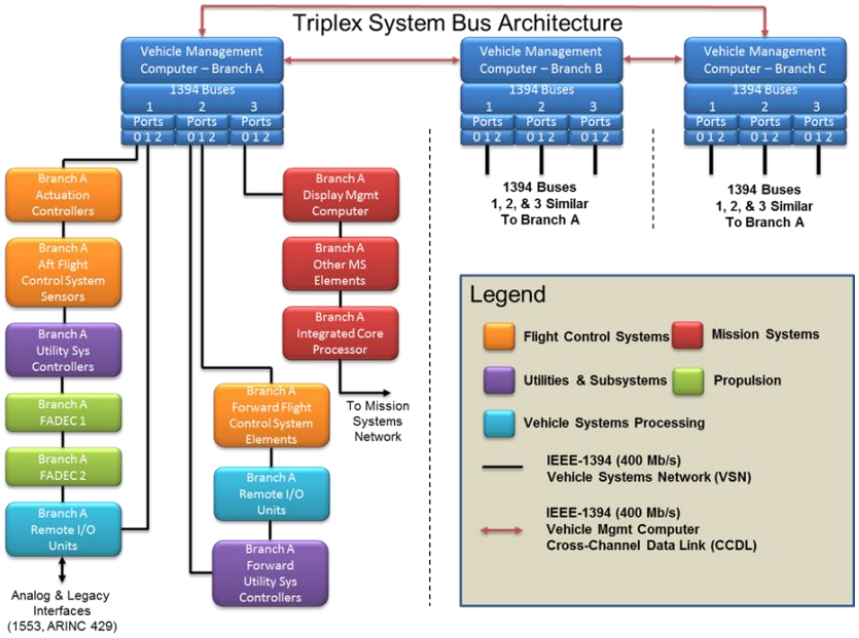
Deterministic

- Time synchronization is determined by the Control Computer (CC) sending out Start of Frame (STOF) packets at the specified frame rate (typically 80Hz or 100Hz)
- All Remote Nodes, aka LRUs, receive the STOF packets and synchronize to them
- The ASM messages are transmitted at the network profile assigned offset times relative to the STOF
- Receiving nodes can deterministically anticipate and therefore guarantee resources are available and therefore guarantee the message can be received and processed.
- The network profile system architecture determines the frame rate and offset time for every node on the 1394b bus
- Offset times can be adjusted during initialization



Fault Tolerance

- Fault tolerance in a Vehicle System Data bus is essential to keep an aircraft flying even when one or more components fail
  - AS5643 capitalizes on 1394b loop topology support to create the first level of fault tolerance
  - Dual or Tri redundant system architecture provides a second level of fault tolerance
- CRC and Vertical Parity Check (VPC) provide both bus level and system level error detection
- Remote node (LRU) generated heartbeat is monitored by the CC, aka Vehicle Management Computer (VMC), to insure the device is operational and sending fresh data



Low Cost, Low Risk

- Unlike other technologies, AS5643 didn't create new requirements causing changes to existing COTS 1394b silicon solutions
  - CC's typically use the same Open Host Controller Interface (OHCI) implementations used in Macs and PCs
  - LRU's typically use the same general purpose implementation used in cameras, robotics and other industrial applications
- In addition to nearly two decades of commercial use, 1394 and AS5643 are actively being used in multiple aerospace and defense programs
  - Fix wing, Rotorcraft, UAV, Missiles and Spacecraft
- Takes full advantage of existing 1394 ecosystem such as chipsets, IP-cores, software stacks, test and measurement equipment and manufacturing test systems

SAE Work

- Within the SAE Aerospace Systems, AS-1A-3 group the following standards or recommendations have been developed relating to AS5643 and IEEE-1394
  - AS5643 – IEEE-1394b Interface Requirements for Military and Aerospace Vehicle Applications
  - AS5643/1 – S400 Copper Media Interface Characteristics Over Extended Distances
  - AS5657 – Test Plan/Procedure for AS5643
  - AS5706 – Test Plan/Procedure for AS5643/1
  - AIR5654 – IEEE-1394b for Military and Aerospace Vehicles – Applications Handbook
  - New slash sheets for S100 and S200 over copper