Shyamal (Sam) Mahajan
Director - APAC

Data Device Corporation & Power Device Corporation

Your Solution Providers for... Connectivity, Power and Control!

- Established 1964
- Manufacturing Operations:
  - New York, San Diego, UK & Mexico
  - >200,000 sq-ft
  - ISO9001:2015. AS9100:2016
  - MIL PRF-38534, MIL-PRF-38535
- Engineering Locations:
  - New York, San Diego & UK
- ~600 Employees Worldwide
- Sales & Support:
  - DDC: USA, UK, France, Germany, India, Japan
  - Local Representatives in 36 Countries

Data Device Corporation
Headquarters – Bohemia, NY

Space Microelectronics
San Diego, CA

Pascall
Ryde, Isle of Wight , UK

Beta Transformer
Bohemia, NY

Beta Transformer
Ensenada, Mexico

North Hills
Matamoros, Mexico

Organizational Split for Greater Customer Focus

Data Device Corporation and Power Device Corporation

Databus Components & Boards Business Units (Long Island, NY)

Broad portfolio of military and space grade networking solutions.
MIL-STD-1553, ARINC 429, Fiber Channel, CANbus. Products: components, boards, hybrids, computers.

Magnetics Business Unit (Long Island and two Mexico plants)

Complementary mainly to Databus, and also Power Control products. Products: Transformers, inverters, couplers, pulse & power magnetics, 1Gb Ethernet magnetics, 1394b Firewire magnetics, cable assemblies.

Power Control & Motion Control Business Units (Long Island, NY)

Solid State Power Controllers, motor controllers and high-precision analog to digital converter solutions. Products: components, boards, hybrids, SSPC LRUs.

Space Business Unit (San Diego, CA)

Radiation hardened components, memory products and triple-redundant processor-based board solutions. Products: components, boards, hybrids, computers.

Power Supplies Business Unit (Isle of Wight, UK)

Compact power supplies for harsh military, civil aerospace and industrial applications.
Products: boards, LRUs.

Product Overview

DATA DEVICE CORP

Data Bus Solutions & Systems

Data Bus Components Business Unit

Bohemia, NY

Core competency with an extremely broad portfolio of military and space grade deterministic networking solutions:

- MIL-STD-1553
- Space Grade Class K 1553
- ARINC 429
- Time Sensitive Networking (TSN)

Data Bus Systems Business Unit

Bohemia, NY

Rugged, configurable and scalable low power computing platforms & boards supporting a wide variety of networking protocols, including: MIL-STD-1553, Ethernet, ARINC 429, CANbus, Fibre Channel, SpaceWire. Network testers, cables & couplers.

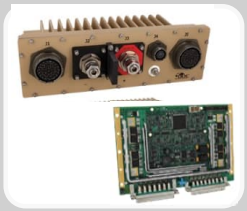
Magnetics Business Unit

Bohemia, NY, Matamoros, MX Ensenada, MX

Power & switchmode transformers, and inductors designed and built to meet the rugged requirements of MIL-PRF-27 and MIL-STD-981, for use in high reliability military, aerospace and space applications.

POWER DEVICE CORP

SSPC, Power Supplies & Magnetics



Power Control Business Unit

Bohemia, NY

World leader in Solid State Power Control Solutions simplifies platform power control and provides health and diagnostics data that allows the operator to focus on other mission critical activities

- Ground Vehicles
- UAVs
- Mission Aircraft

Power Supplies Business Unit

Ryde, IOW, UK

30 years of experience in the defense, aerospace and industrial sectors, PDC is a trusted source for complete solutions in the design, development and manufacture of electronic power conversion products – from single converters to complex multi-function conversion systems.

Motion Control Business Unit

Bohemia, NY

Leader in high reliability motor control and synchro/resolver motion feedback solutions

- Synchro/Resolver to digital converters
- Digital to Synchro/Resolver
- Sine Reference Oscillators
- Synchro Boosters
- Resistor Networks

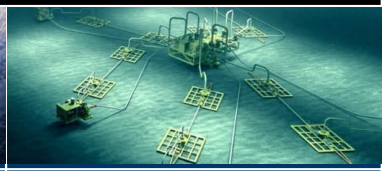
Space Business Unit

Poway, CA

PDC is a leading supplier of space qualified SBCs and radiation hardened components

- Single Board Computers
- Memory Devices
- Interface Logic
- Switches / Muxes
- A/D Converters
- D/A Converters
- Nuclear Event Detectors

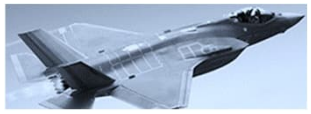
Markets/Solutions

DDC's & PDC's Field Proven Technology Can Be Found On Almost Every Military & Aerospace Platform		Markets			
					
		Defense	Civil Aviation	Space	Industrial
Solutions	**Connectivity** • Data Bus Components • Data Bus Boards • Fibre Channel & High Speed • Signal Transformers & Couplers	Market Leader in MIL-STD-1553 Components & Boards	ARINC 429 Boards & Components, ARINC 629 Plastic Optical Converter LRU	Class H/B & K/S MIL-STD-1553 Hybrid Microcircuits, Radiation Tolerant Transformers, Couplers, Memories, Data Converters and Single Board Computers	High Temperature MIL-STD-1553 Components
	Power Control • Solid State Power Controllers • Motor Control Systems • Power Supplies	Largest Installed Base of SSPCs in Industry, Market Leader in Power Supplies	Flight Certified SSPCs, Leader in IFE&C Power Supplies	NASA-qualified Radiation Tolerant Magnetic Solutions	High Temperature Magnetics and Power Supplies for Sub-Sea and Harsh Environments
	Motion Control • Motor Controllers & Drives • Motion Feedback – Synchro/Resolver	High Reliability Motor Controllers, Market Leader in Synchro/Resolver Conversion	High Reliability Motor Controllers, Incumbent RDC Design-ins	Radiation Tolerant Motor Controllers, RDCs & Reference Oscillators	Transportation, Factory Automation, High Temperature Position and Motor Control Solutions

Heritage… Nearly 60 Years of Experience

Defense Aerospace

A-10 Thunderbolt
AH-64 Apache
B-2 Spirit
C-17 Globemaster III
C-130 Hercules
E-4B
E-6B
F-16 Falcon
F/A-18 Hornet
F-22 Raptor
F-35 Joint Strike Fighter
GlobalEye AEW&C
KC-10 Extender
MH-60
RQ-4 Global Hawk
UH-60 Black Hawk
V-22 Osprey



Weapons Systems

AIM-9x Sidewinder
AIM-120 AMRAAM
AN/AAQ-24
IRIS-T SL
Javelin
JDAM
M51 SLBM
Patriot
Phalanx CIWS
Red Shark Torpedo
Sigma 95N
SN/ASQ ATFLIR
THAAD

Naval

AN/BLQ-11 LMRS
AN/GSC-92 Antenna
CVN Aircraft Carriers
DDX Destroyers
Seaspray Radar
Virginia Class Submarine

Ground Vehicles

AMX-56 Leclerc Tank
Bradley Fighting Vehicle
Foxhound LPPV
JLTV
K21 Fighting Vehicle
M1A2 Abrams Tank
M270 MLRS
M992 FAASV
Paladin Mobile Howitzer
Puma Fighting Vehicle
Stryker
TALON Military Robot

Space

Ariane 5 Rocket
BioSentinel
Chandrayaan-1
RSGS
ESA Euclid Satellite
ExoMars
Gaia
GOSAT-2
Jason-3
JPSS
Mars Curiosity
Orion
SBIRS-GEO 1 Satellite
SLS
Spacebus 4000
SpaceX Dragon
WFIRST

Civil Aerospace

Airbus A350, A380
Boeing 777X, 787
Bombardier CRJ
Cessna 680
COMAC ARJ21, C919
Dassault Falcon 7x
Embraer EMB 145, ERJ
Eurocopter
Gulfstream GV
Hawker Beechcraft
Sikorsky

Design & Engineering Capabilities

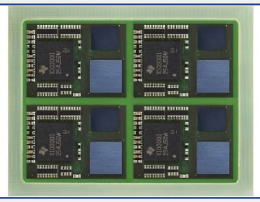
Product Capabilities

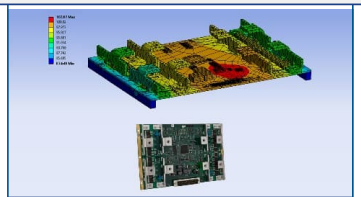
- World's smallest MIL-STD-1553 interface – Nano-ACE BC/RT/MT
- Synchro-to-Digital Converter accurate to 1 Arc-minute – RD-19231
- Power, Data Bus, Motion Control, Semiconductor, MCM & Hybrid Design, Assembly & Test
- MCMs with SMT, Flip Chip & Wire Bonds in combination
- Surface-Mount & Through-Hole PCB Design & Assembly
- Magnetics for Signal Processing, Data Bus, Power
- Processor Based Solutions

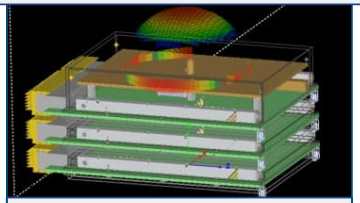
Engineering / Mechanical Capabilities

- Analog, Digital, FPGA & ASIC Design
- Printed Circuit Board Design, Assembly Test & Evaluation
- In-House EMI Test Chamber
- Mechanical & Process Engineering
- Design Validation, Verification & Qualification
- Ruggedization & Thermal Management
- DO-178 Software & DO-254 Hardware
- Radiation Mitigation Through Shielding, Design, & Process
- Design, Assembly & Test of Magnetics & Transformers

Design & Engineering Capabilities


MCM & Hybrid Design


Thermal Management


Design Validation


Processor Based Solutions


In-House EMI Test Chamber

Design, Assembly & Test Capabilities

- **Production Capabilities**
  - Fabless ASIC Design Boutique
    - Tier 1 Supply Chain for Foundry, Assembly & Final Test
  - Hermetic & Non-Hermetic Hybrids
  - MCMs featuring SMT, Flip Chip & Wire Bonds in Combination
  - 3D MCMs with Memory Die Stacked up to 8 high
  - Most Advanced, Fully Automated Surface-Mount & Thru Hole CCA line
  - Transformers & Magnetics
  - Radiation Mitigation through Shielding, Design, & Process
  - Processor Based Solutions
  - Fully Integrated Black Boxes

Printed Circuit Card Solutions

US Based Manufacturing

3D Optical Inspection

Highly Accelerated Stress Screening

Semiconductor, MCM & Hybrid Solutions

Automatic Die Bonding

Real-Time X-ray inspection

Computer Aided Manufacturing

Signal & Power Transformer Solutions

Quad Pick & Place

Magnetics & Transformers Design

Assembly Test & Evaluation

Quality Control

- Certifications & Qualifications
  - ISO 9001:2015 Registered
  - AS9100, Rev. D Certified
  - EN9100 Compliant
  - JIS Q9100 Compliant
  - MIL-PRF-38534 Class D, G, H & K
  - MIL-PRF-38535 Class B, Q, S & V
- Product Qualifications
  - DO-254
  - DO-178
  - DO-160
- Audited & Approved Supplier for:

Customer Focused

- Best In Class On-time Delivery & Quality Recognition
  - Raytheon:
    - 3 Star Supplier Excellence: 6 Time
    - Network Centric Systems 3 Star Supplier Excellence Award
    - IDS Supplier Excellence Award
    - Supplier Excellence Award
  - Lockheed Martin:
    - Platinum Level Preferred Supplier Award
    - STAR Supplier Award
    - Preferred Supplier Gold Supplier Award
  - General Atomics:
    - Supplier of the Year Award: 5 Time
  - L-3 Communications Systems-West:
    - Platinum Award for Exceptional Supplier Quality & Delivery Performance
  - Honeywell Sensor and Guidance Supplier Excellence Award
    - CASS CSP Support Symposium Award for Outstanding Supplier Performance

New Product Development

New product development

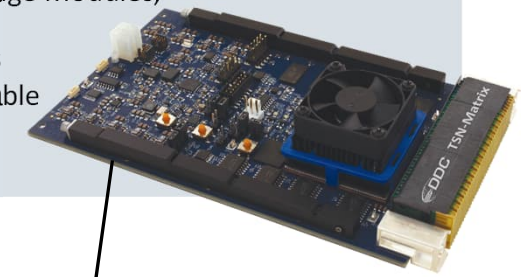
- Time Sensitive Networking (TSN)
- High Density Multi-Chip Packaging
  - New MIL-STD-1553 Terminal Interfaces
  - TSN System in a Package
- Next Generation MIL-STD-1553 Test Device
- Enhanced AIC (EAIC) Embedded Computer
- Next Generation MIL-STD-1553 Components

Built upon a legacy of field proven technology

- Low latency / Deterministic / High Integrity
- Proven interface
- Ease of integration
- Optimized SWAP-C

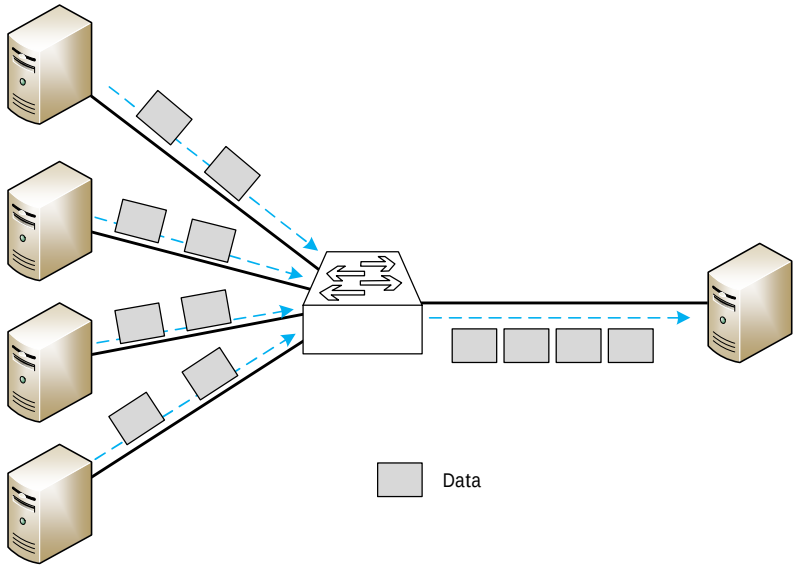
Time Sensitive Networking (TSN)

- Deterministic Realtime Ethernet
- Digital Backbone for Future Platforms
- Consistent with MOSA
  - IEEE 802.1 DP TSN Profile for Aerospace
- Products in Development
  - TSN-Access End System Interfaces
    - IP Core, System-in-Package Modules, and Boards
  - TSN Matrix Network Switches
    - 3U VPX Prototype available
- Certifiable to DO-254 and DO-178 DAL A



Ethernet is Not Deterministic

- Frames from multiple sources sent to the same destination can lead to Oversubscription (run out of buffers)
- Ethernet uses “Store and Forward” to mitigate Oversubscription
- Ethernet switches drop frames when they run out of buffers (lossy)
  - Ethernet does not implement flow control
  - Non-Reliable Transport at Layer 2
- Buffering causes variation in delay through the network



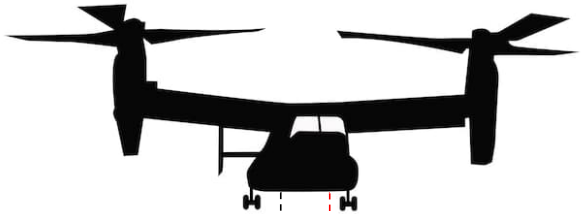
What is TSN?

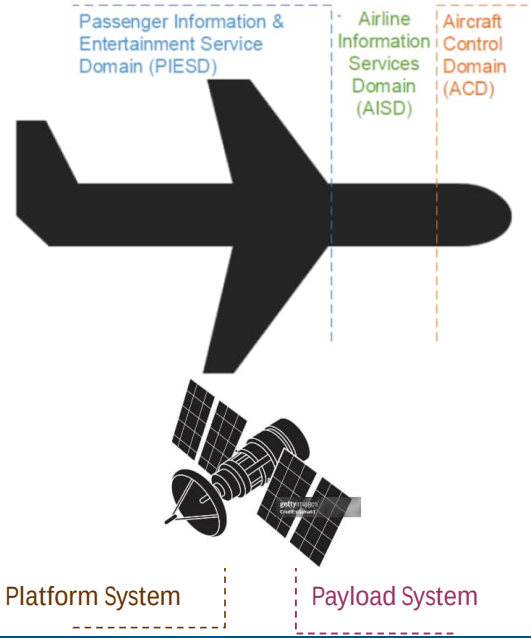
- TSN is a large family of features aimed at making Ethernet Deterministic
- TSN is not a “One-Size-Fits-All” set of functions
- Industries rely on Profiles to facilitate interoperability for specific Use Cases

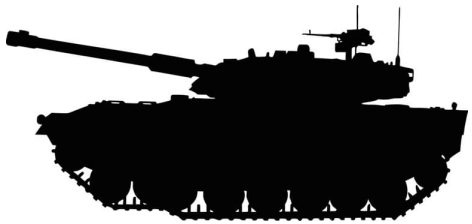
- TSN Standards
  - 802.1AS-2020 Time Synchronization
  - 802.1ASed Fault Tolerant Timing with Time Integrity
  - 802.1Qbv Time Aware Shaping
  - 802.1Qci Ingress Filtering and Policing
  - 802.1CB-2017 Stream Identification and Seamless Redundancy
  - 802.1Qav Credit Based Shaping
  - 802.1Qcc Configuration and Management
  - 802.1Qcp YANG configuration Models
  - 802.1Qch Cyclic Forwarding
  - 802.1Qcr Async Traffic Shaping
  - 802.1Qbu Frame Preemption
  - 802.1Qca Path Control and Reservation
  - 802.1Qat Stream Reservation Protocol

Aerospace Profile

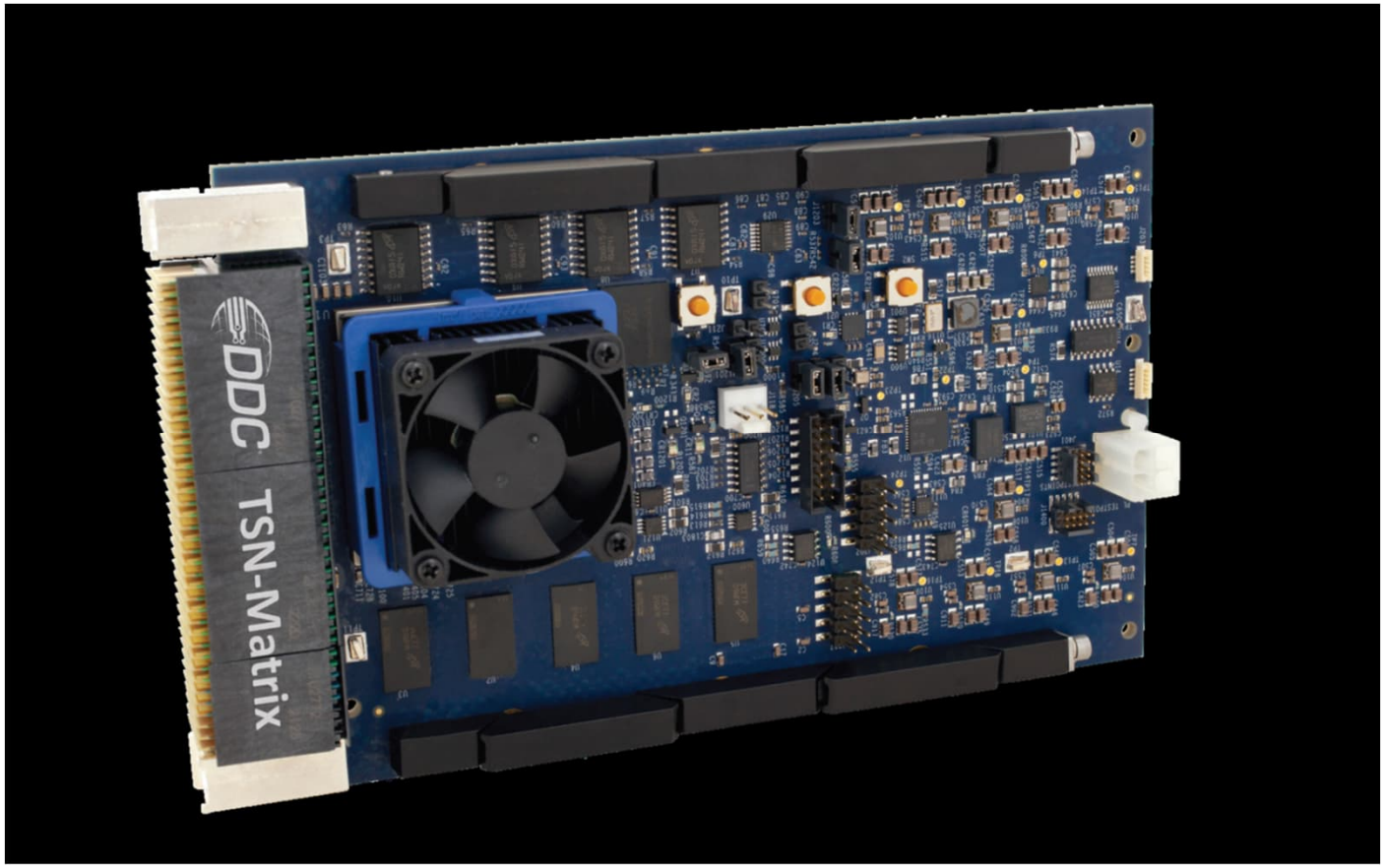
- Formal collaboration SAE and IEEE 802.1 TSN Working Group on the development of a Profile of TSN for Aerospace
  - IEEE 802.1DP Time-Sensitive Networking (TSN) for aerospace onboard Ethernet communications
  - Draft Standard formally approved 10-September-2025
- Defines a “Certifiable” subset of TSN for Aerospace





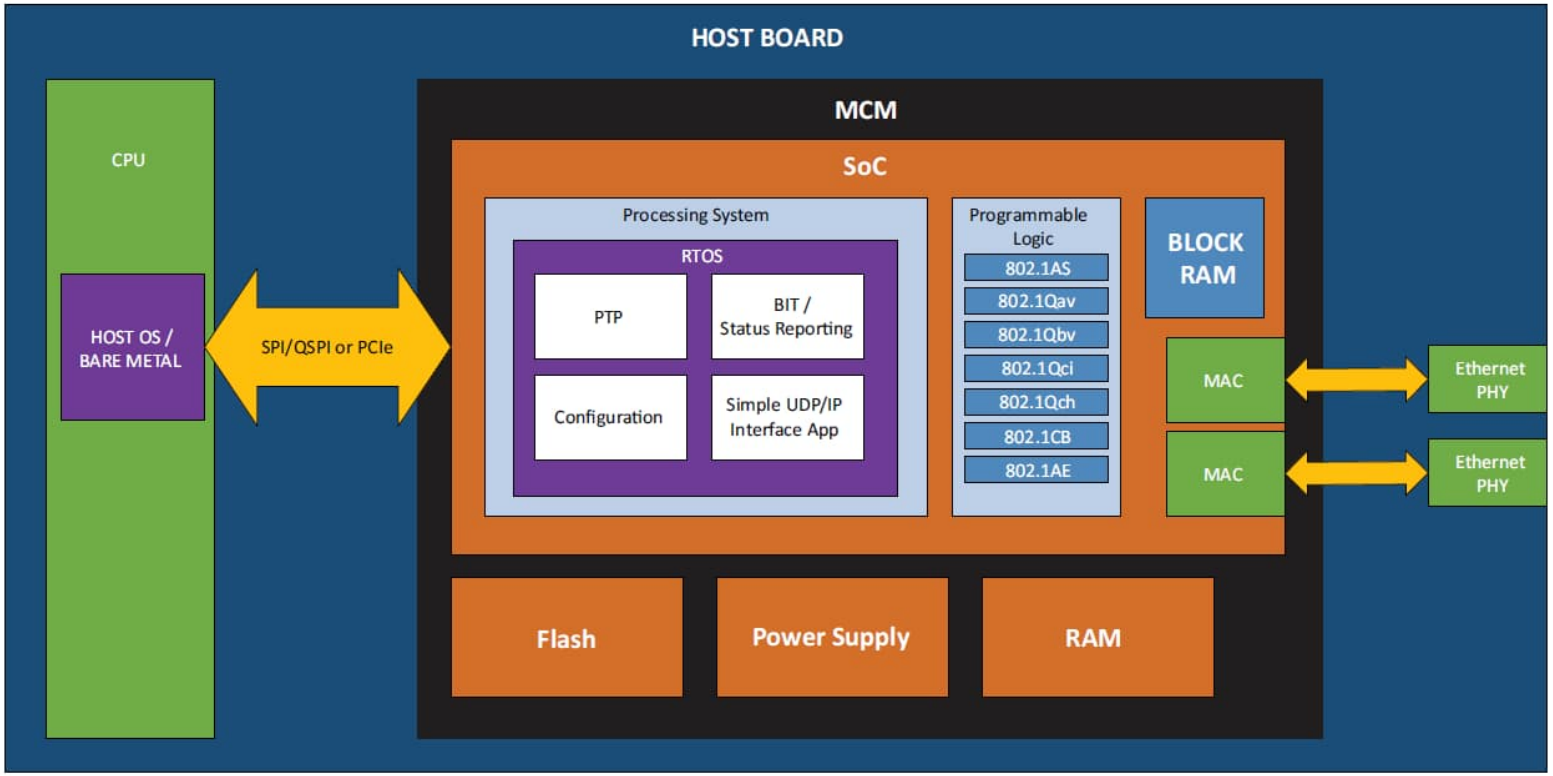


TSN Matrix Switch



TSN End point and Block diagram

Block Diagram



DDC TSN Product Roadmap

End System

Switch

Prototype End System PCIe card (prototype End System component)

"TSN Access" End System IP Core

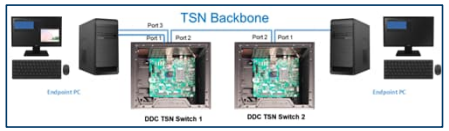
"TSN Access" End System Prototype Component

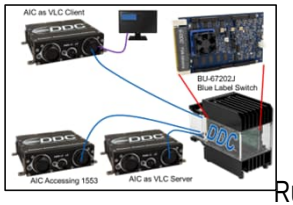
"TSN Access" Roadmap

- Compute Node ES
- Bridged End System
- Switch

32-port VPX TSN Switch

TSN Eval Systems





DDC "TSN Matrix" Switch Technology in an FPGA Eval Board

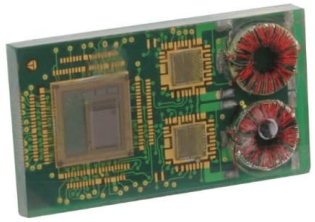
"Lab Protype" 12/16-port VPX TSN Switch

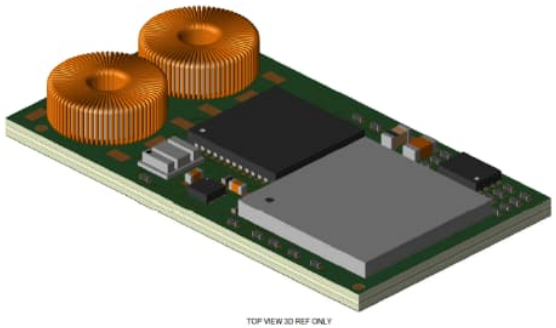
16-port VPX Rugged/Production TSN Switch

Today 2025 2026 2027

Cyber Resilient Total-ACE

- MIL-STD-1553 Features (Same as Total-ACE):
  - Single Package w/ Transformers Inside
  - Processor Local Bus to 1553 Interface
  - 64K x 17 Buffer RAM
  - Highly Autonomous BC Architecture with Message Sequence Controller
  - Flexible RT buffering with Single, Double and Circular Buffering
- Hardware Watchdog (HWWD) Cyber Resiliency Features:
  - Allow List restricts LRU to its ICD (BC and RT mode)
  - Remote Terminal transmissions restricted to valid “response window” (mitigate denial of service attack)
  - Active Fault Injection (AFI) stops superseding/injected commands from malicious device
- Benefits:
  - “Baked-in” solution that is part of a layered approach to cyber mitigation
  - Configuration programmed from an external entity, independent of the host processor (host has no access to the configuration)
  - Pin and Software Compatible with DDC’s popular Total-ACE Component
  - FPGA-based prototype enables evolution of mitigation features
- Prototypes March 2024
  - BU-64863T8-602

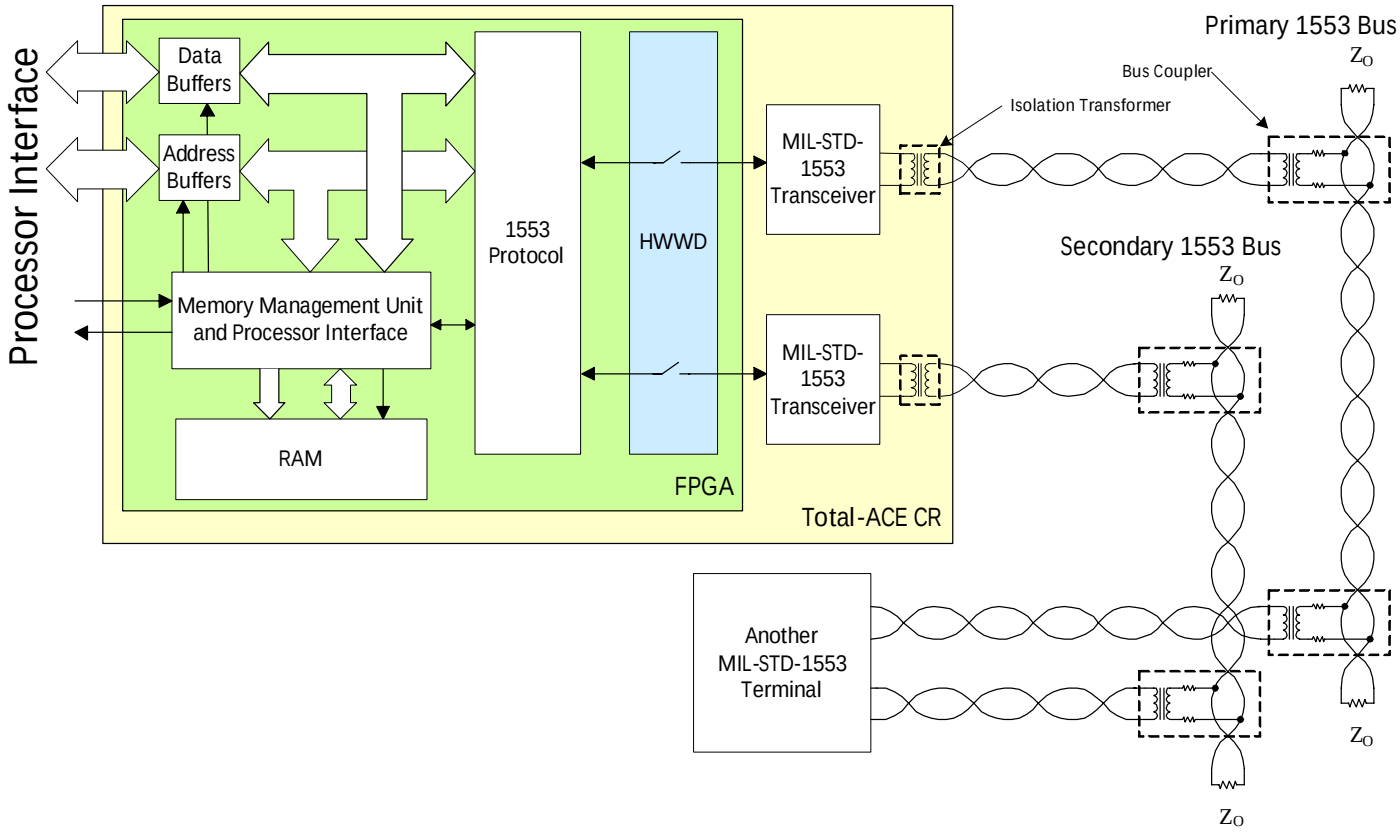




BU-67833LC Nano-ACE™ BC

- Small Complete 1553 Interface
  - BC, RT, MT or RT/Monitor Operation
  - 4K x 17 or 32K x 17 SRAM
  - Dual Low Power MIL-STD-1760 Transceivers
- 4-Wire Serial Peripheral Interface (SPI)
  - Operates up to 50 MHz
- 48 Pin QFN Package
  - 7mm x 7mm x 1mm
- Powered from +3.3V Only
- Auto-initialization option
  - Automatically load user defined values into RAM and registers on power-up from an external EEPROM
- Autonomous Self-Test
- Software Compatible with ACE, Mini-ACE, Enhanced Mini-ACE, uACE, and Total Ace Series Components

Total-ACE CR Block Diagram



Total-ACE CR with Hardware Watchdog (HWWD)

- Allow List
  - BC and RT mode
  - Verify that only commands listed on the ICD are allowed
  - Block potential malicious messages
- Active Fault Injection
  - Can be implemented in the active bus controller or in a separate node
  - Monitors the bus with knowledge of when the BC is sending messages and the rate at which it sends messages
  - Able to identify commands from sources other than the active BC
  - Injects an intentional error when a command from another source is detected, thus blocking a potential masquerade attack

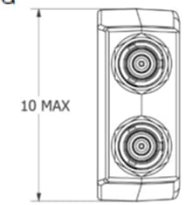
BusLink USB to 1553 adapter

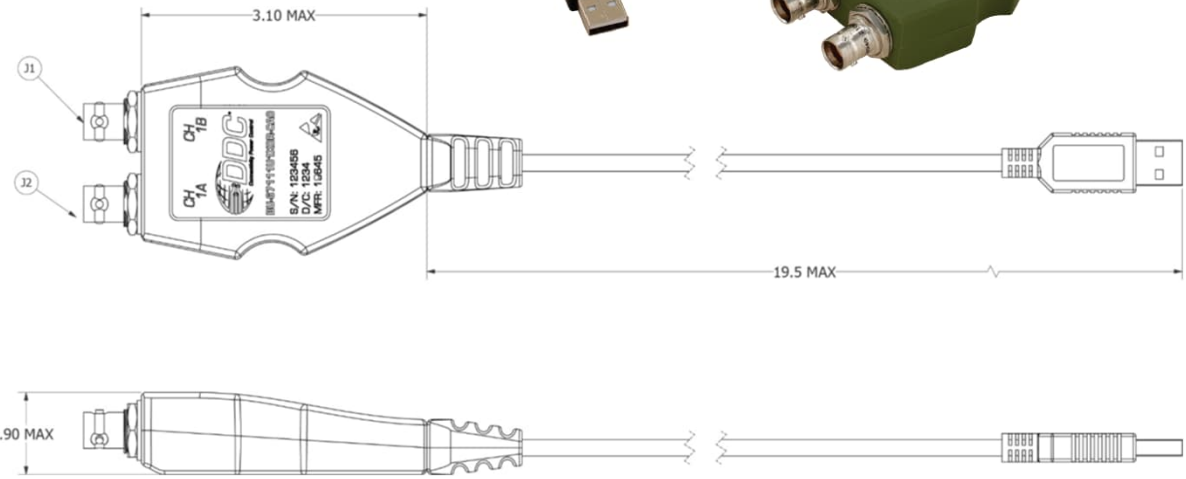
- BU-67111U Series
  - Small, lightweight, and low power 1553 solution
  - Portable USB Bus Powered
  - Cost effective solution
  - 1 Ch. MIL-STD-1553
  - Temp Range -20°C to +60°C
    - Various MIL-STD-810 Qualifications
  - Windows and Linux Support

- Applications Include
  - Lab Testing/Troubleshooting
  - Simulation
  - Portable Test Equipment
  - Flight Line and Diagnostic Testing
  - Software Development
  - System Integration
  - Automatic Test Applications (ATP)

BU-67111U1 X0R-CA0

- CA= -18°C to +60°C Air Cooled
- 0 = Camouflage Green
- 1 = Desert Tan
- 1 = 1 MIL-STD-1553 Channel
- 1553 BusLink USB device

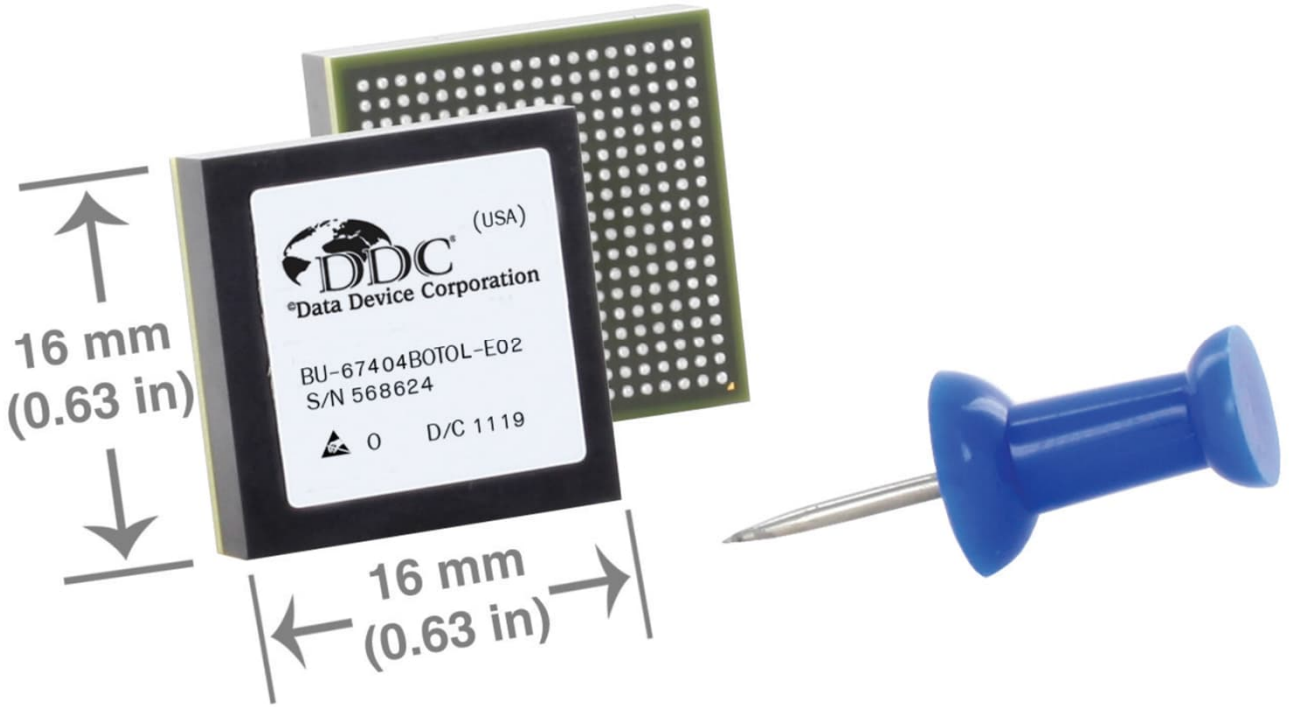




New USB Avionics Tester

- BU-67130U (Q4 2025)
  - Thunderbolt 4 (USB-C) Interface to PC – 40Gbs
  - Portable USB-C Bus Powered
  - Up to 2 Ch. 1553 (Multi-Function AceXtreme Architecture Available)
  - Up to 8 Programmable Ch. ARINC-429
  - 2 Programmable Serial I/O (RS-232/422/485)
  - 8x Discrete I/O
  - 8x AVIO
  - IRIG-B
  - Temp Range -20°C to +60°C
  - Windows and Linux Support
- Applications Include
  - Lab Testing/Troubleshooting
  - Simulation
  - Portable Test Equipment
  - Flight Line and Diagnostic Testing
  - Software Development
  - System Integration
  - Automatic Test Applications (ATP)

MIL Grade PHY device



ASIC V/s IP

ASIC Reliability

•Fewer Components:

MTBF is roughly proportional to the total number of hardware and software components used in a system design. An ASIC consolidates the functionality of many individual components or intellectual property (IP) blocks into a single chip, inherently reducing potential points of failure (e.g., fewer solder joints, connectors, and inter-component wiring).

•Custom Design & Optimization:

ASICs are custom-manufactured for specific tasks and environmental conditions, allowing for rigorous testing and optimization for the target application, which improves overall reliability.

•Hermetic Packaging:

High-reliability applications, such as aerospace and defense, often use hermetic (airtight) hybrid microcircuits that include ASICs, which provide greater protection from environmental factors compared to standard printed circuit board assemblies.

IP Block / Hybrid Reliability

•Component Count:

Systems built from multiple discrete components or standard IP blocks on a board generally have a lower MTBF because each component and connection introduces a potential failur point.

•Standardized Components:

•While PC/server hardware components are based on standards for interoperability, they are not always optimized for the specific environmental or reliability requirements of a specialized system, which can impact overall system MTBF.

PERFORMANCE/POWER CONSUMPTION AND OVERALL COST (in volume)


DDC®