

Advancing the Authenticatable Container Tracking System (ACTS)

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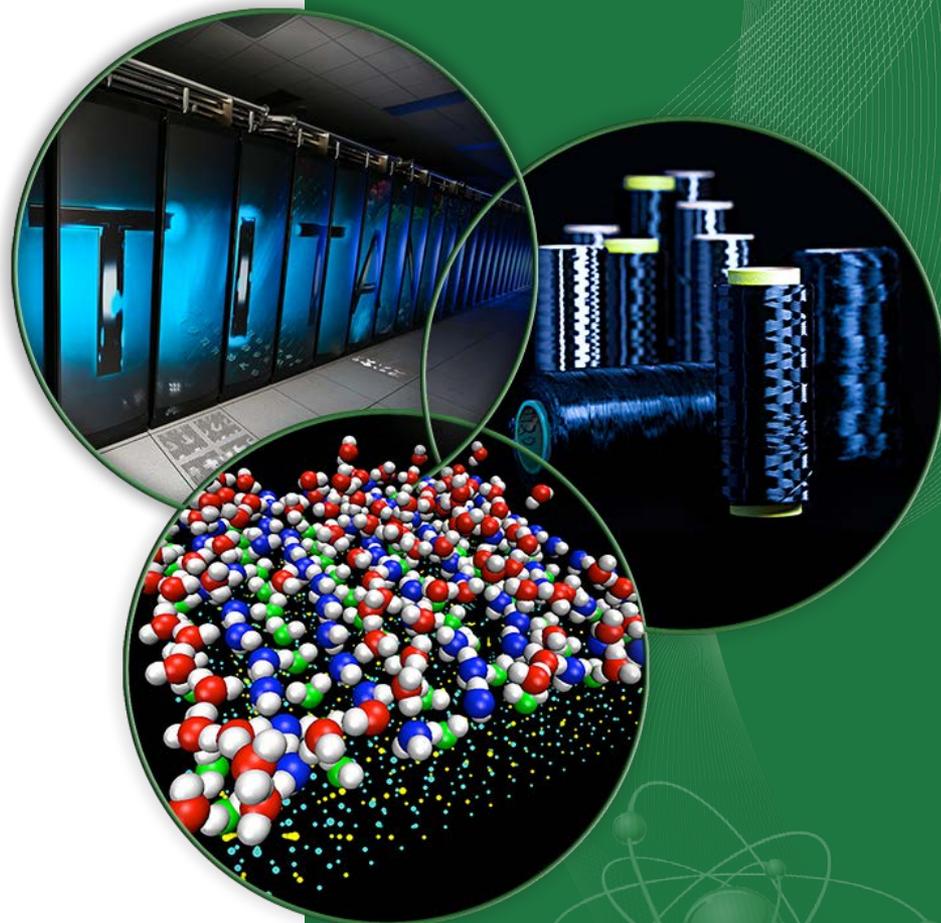
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Agenda

- Concept
- General Capabilities
- Peripheral Expansion Bus
- Data Authentication
- Impulse Radio – Ultra Wideband
- Two-way ranging
- Conclusion



The concept for the Authenticatable Container Tracking System (ACTS).....

- The ACTS concept provides a universal platform, compatible with the ARG-US Transport server, for active monitoring of package containment and location and report status at regular intervals via selectable communication methods.
- ACTS will store sensor events in memory, work with other applicable systems and follow IAEA best practices for data security and authentication.
- ACTS incorporates a universal interface architecture that will enable future peripheral modules to be easily interfaced to the system thus providing an integration path for new technologies.



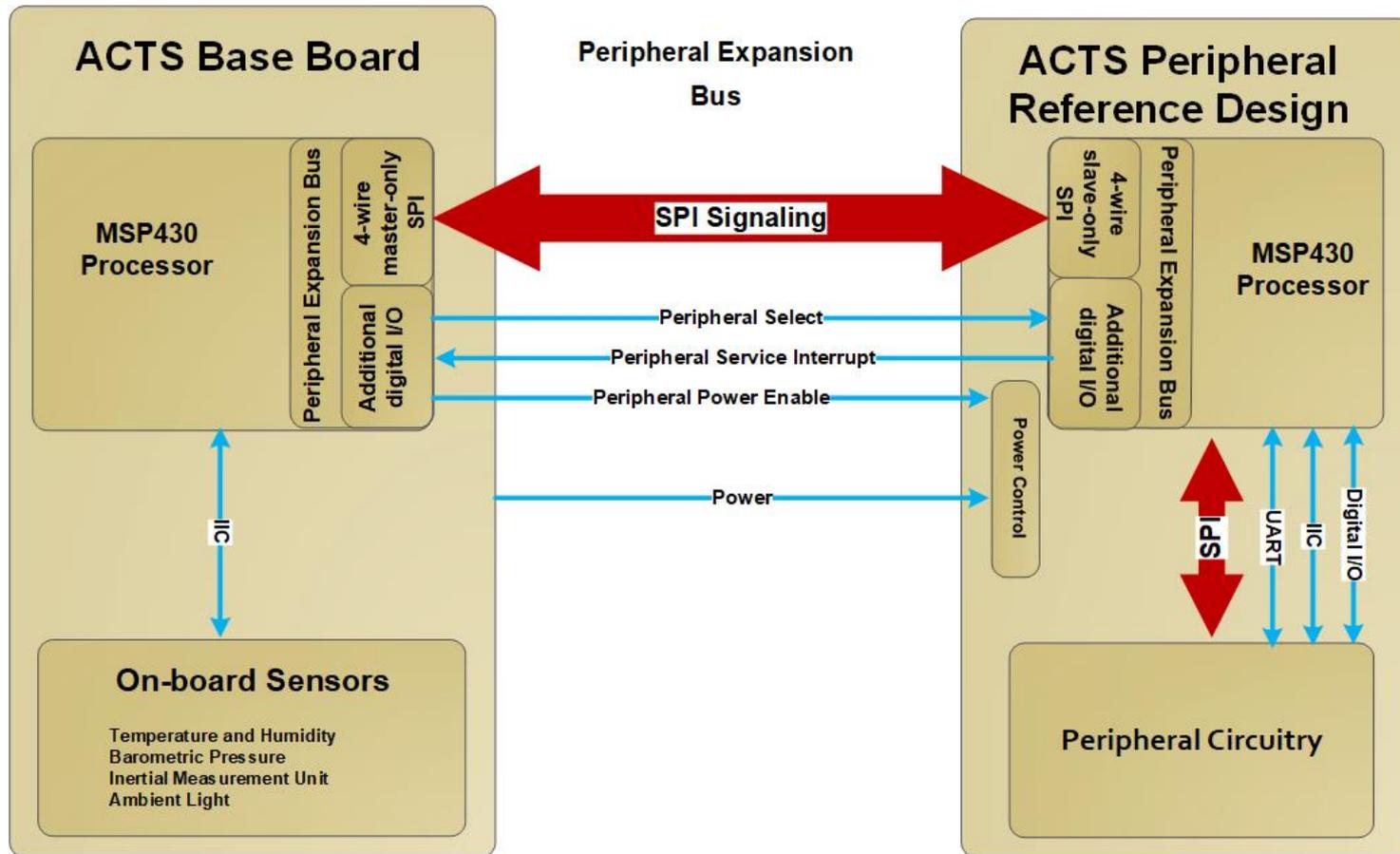
Design features of the latest version of the ACTS base board allowed the foot print to be reduced.



- Replaced JTAG in-circuit programming connector with Spy-Bi-Wire
- Removed USB console/debug port – use MSP FET programmer console/debug back channel
- Replaced MCU with one in the family having more memory



The ACTS base board Architecture, built on a very low power processor, incorporates a base set of sensors and a peripheral interface for adapting to specific applications.



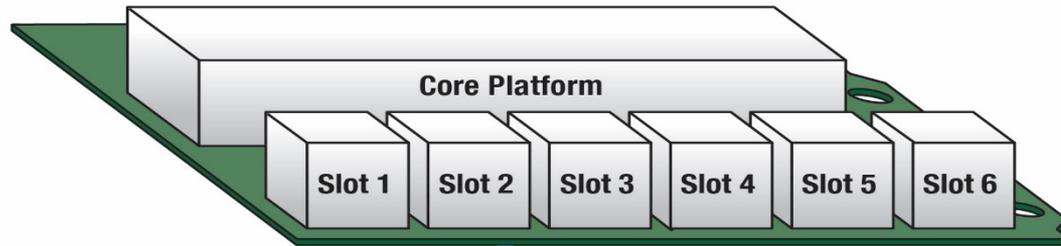
Planned Smart Peripherals

- Peripherals to the motherboard with their own processor and a common interface – read, write, status, configure
- DW1000 transceiver
- Iridium transceiver
- GPS
- Micro SD Card
- Radiation sensors
- SC-HSM (smart card hardware security module)
 - IAEA PKI Infrastructure
 - Encrypt and or sign data
 - Basically a variant of the micro SD Card peripheral

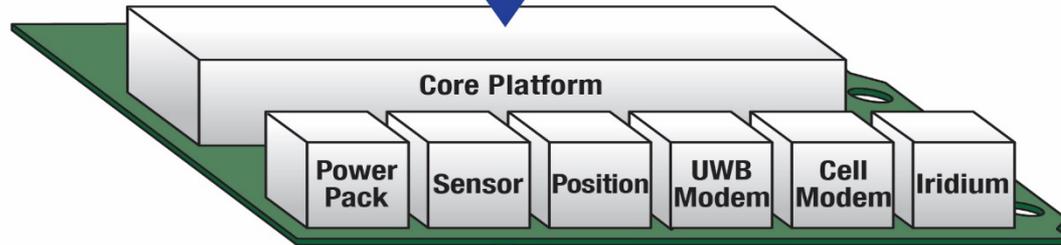


Adaptable for multiple applications

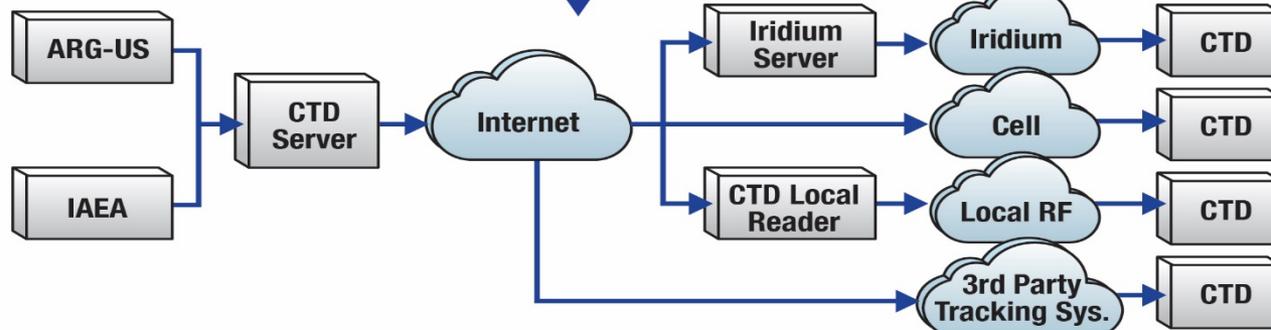
Configurability allows it go from this...



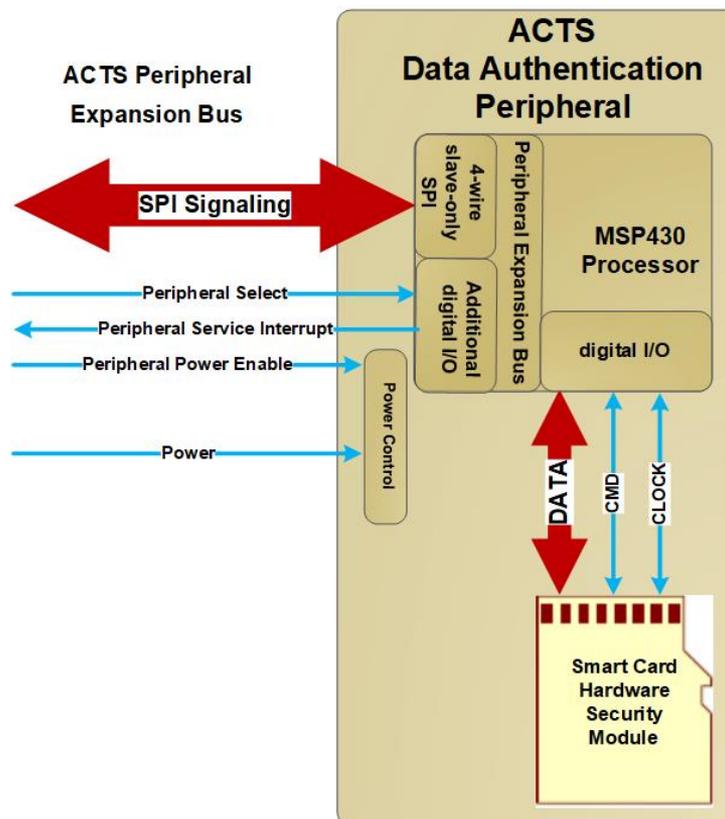
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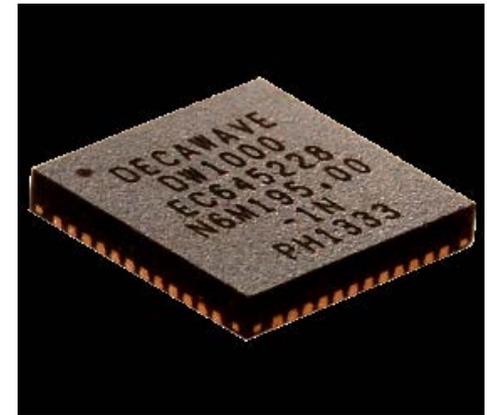
To enable this...



PKI Data Authentication Peripheral for digitally signing data generated by ACTS



DecaWave DW1000 IR-UWB



- Single chip UWB transceiver
- IEEE802.15.4-2011 Standard
- Real Time Location capabilities (10cm indoors)
- Up to 6.8 Mbps
- Coherent receiver (300m range)
- Short packet durations (11,000 devices in a 20m radius)
- Highly immune to multipath fading
- Low power consumption (mode dependent)
- Two-way ranging

Source: decawave.com



EM Environmental Management
safety ✦ performance ✦ cleanup ✦ closure
DOE Packaging Certification Program



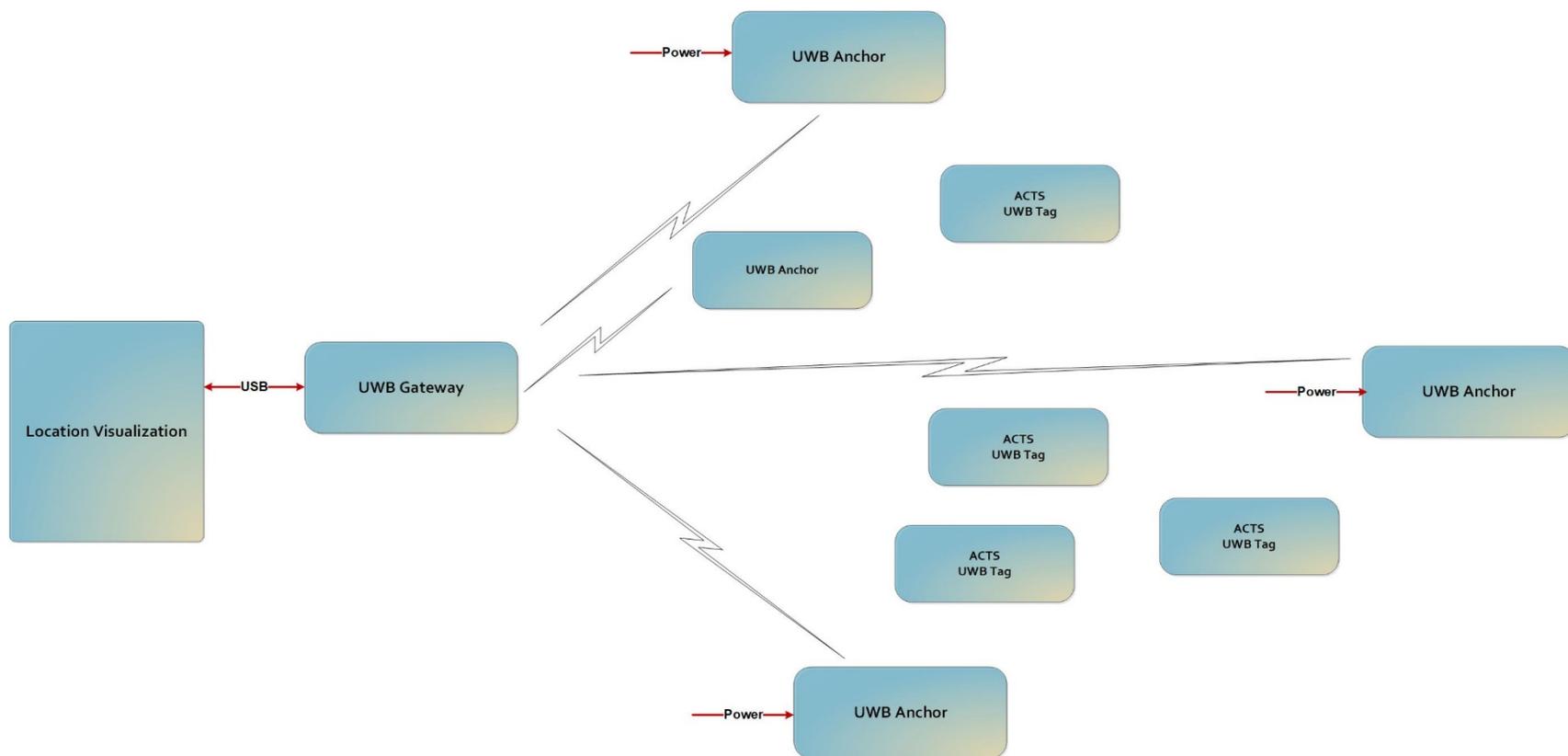
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ACTS tags on UF6 Cylinders



Infrastructure based ranging to locate items for an inspection inventory uses an infrastructure of anchor transceivers at known locations and a visualization system to show tagged assets.



IR-UWB Two-way ranging Infrastructure components

- DecaRanging Listener
- ACTS PC Communications
- DecaRange RTLS

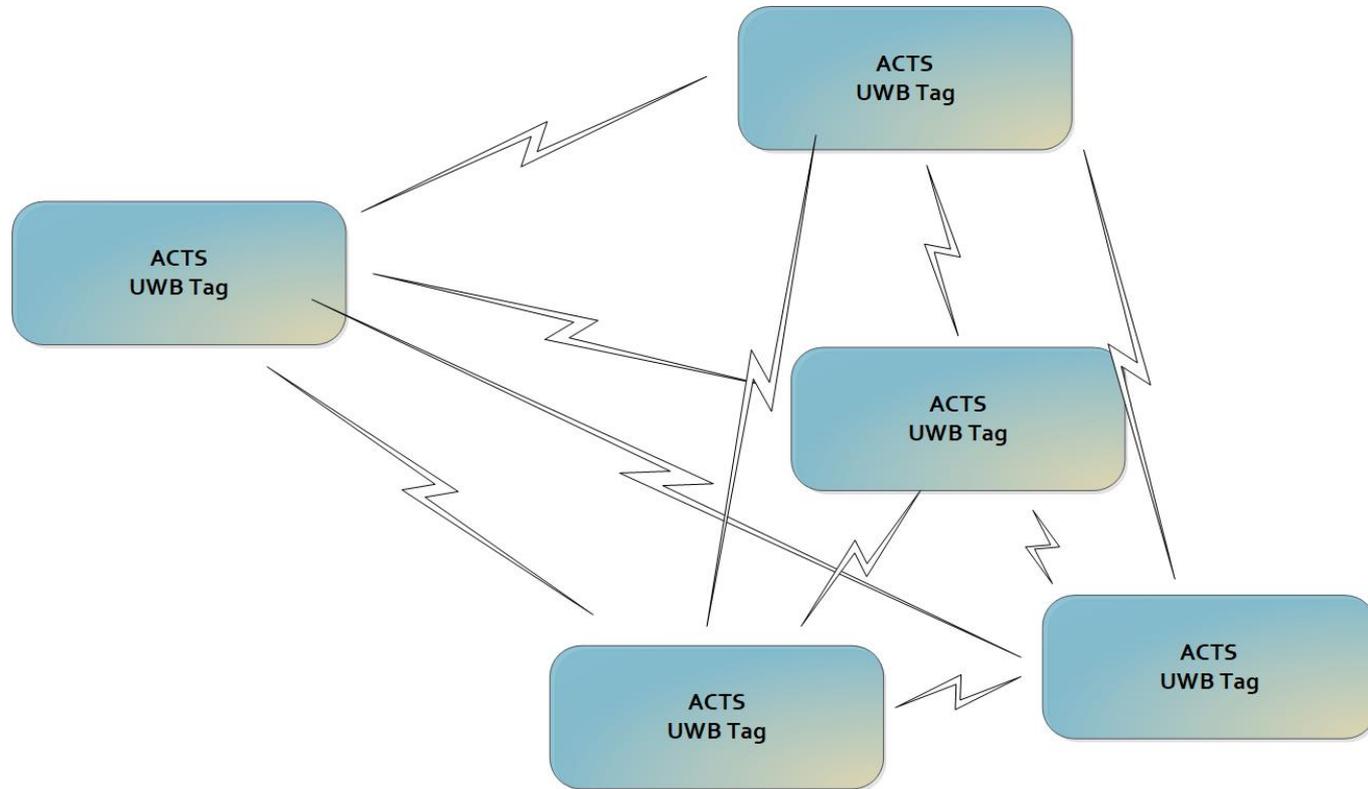


Wireless IR-UWB anchor



PC IR-UWB Gateway

Relative ranging between tags lets each tag determine the distances to neighboring tags to determine relative movements.



Conclusion

- ACTS is a unique universal platform that can be tailored to a variety of package tracking applications
- Can support a variety of communications, location services, and containment monitoring needs
- An ACTS data security peripheral would allow data acquired by ACTS sensors to be digitally signed
- The IR-UWB peripheral enables two-way ranging for locating ACTS tags in 2D or 3D space to facilitate an inventory or to detect the repositioning or movement of ACTS tagged items.

