



412th Test Wing



War-Winning Capabilities ... On Time, On Cost



**A New Standard for
Packets:
RCC 106 Chapter 7**



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Approved for public release; distribution is unlimited.

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Integrity - Service - Excellence

History

- ITC 2012 Multiple Vendors demonstrated working HW
- Multiple Vendors shipping similar HW solutions
- Multiple ranges with multiple vendor solutions
- **SCREAMS STANDARDIZATION**
- R&R (CH10) committee created CR76
 - Mike Golackson
- IRIG106-2015 Chapter 7
 - Packet Telemetry Downlink
 - Responsibility of Data Multiplex Committee
- Appendix Q
 - Supplemental Golay encoding information

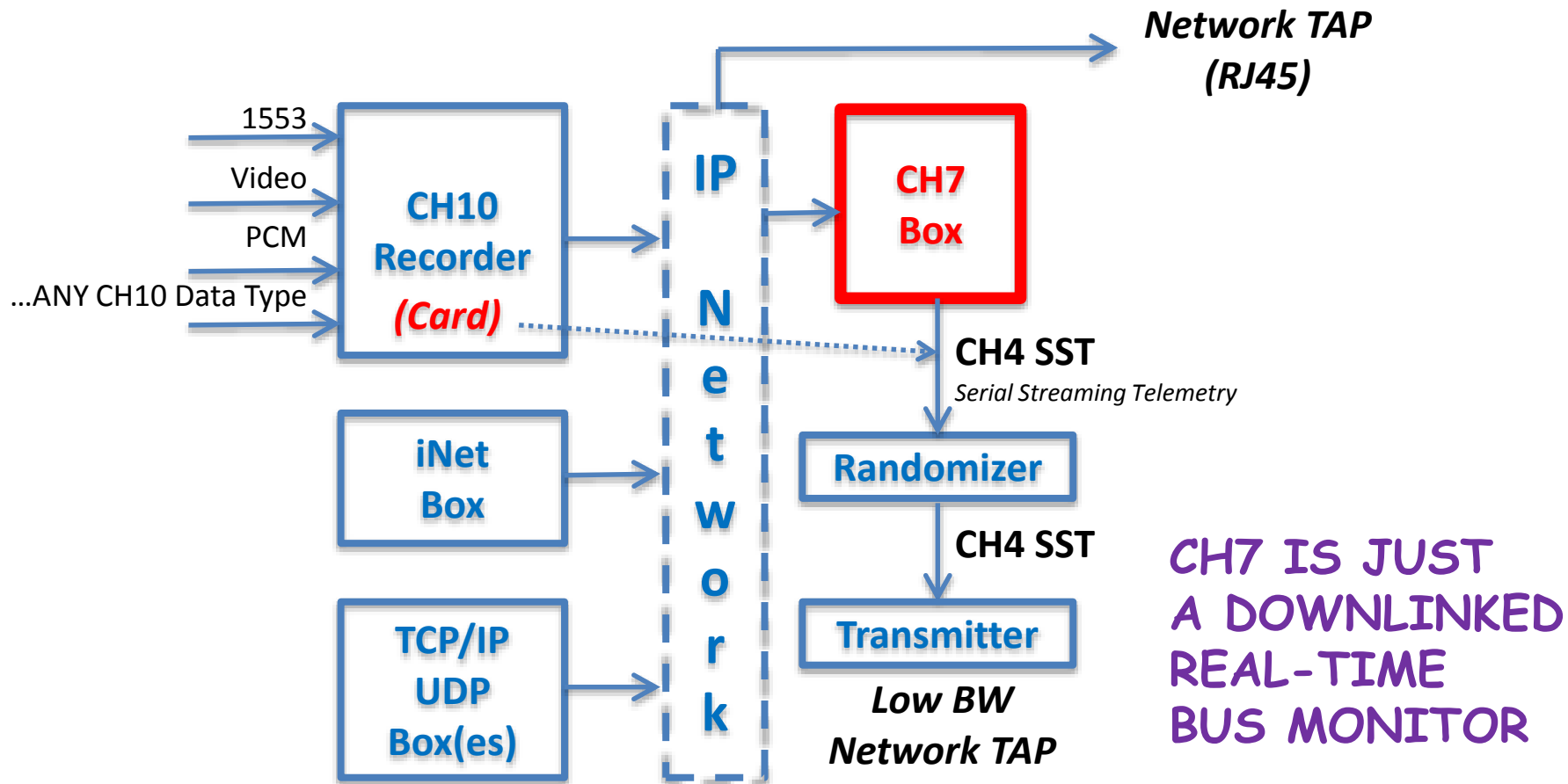
What is it?

- Originally CH10 Only
 - Includes full CH10 data types
 - 1553, PCM, Video, analog, ethernet, etc.
 - Added TCP and general IP packet bus monitoring
 - Included iNet (TmNS) bus monitoring
- Wrapper for the payload of “any packets”
 - CH4 compliant
 - Minimal overhead
 - FEC is added to the CH7 wrapper but not the payload
 - Extended Binary Golay Code
 - Based on CCSDS

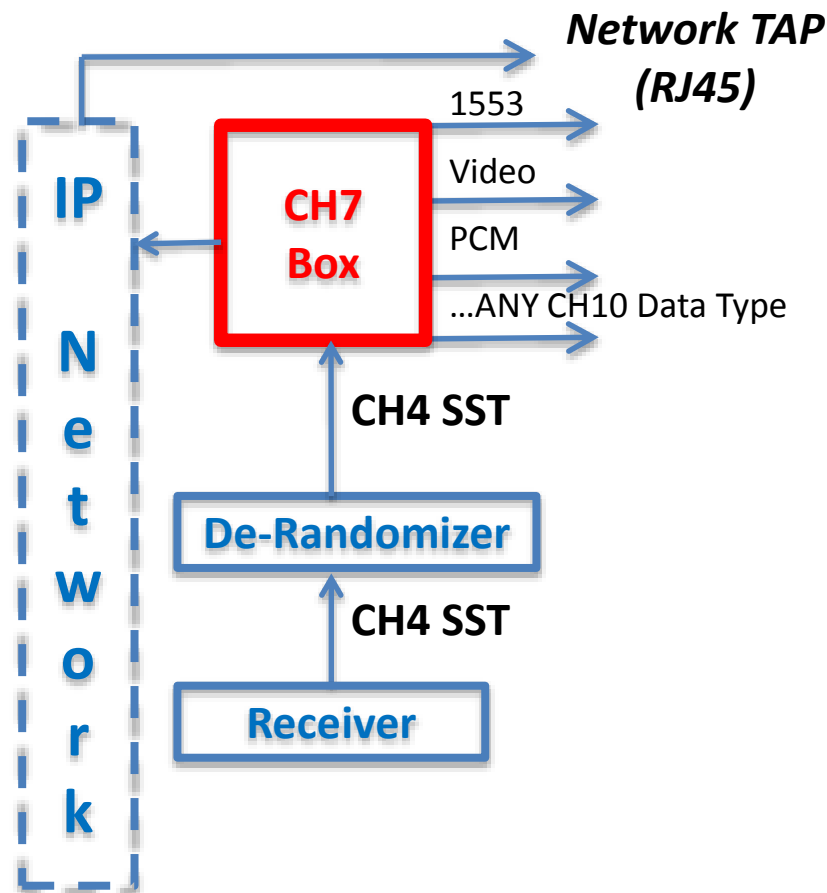
What is it? (cont)

- As Chapter 8 is for 1553, CH 7 is for Data Packets
 - 1553 can be thought of as a ‘small packet’ protocol
- Support for low latency packets
 - Guarantees some data sources have low latency
- Only Packets”
 - No RAW data types added to protocol
- THE FUTURE IS ETHERNET!!!
 - **Everything** has an RJ45 plug
 - (Not saying this is good or bad. It just is.)

What is it? (cont)



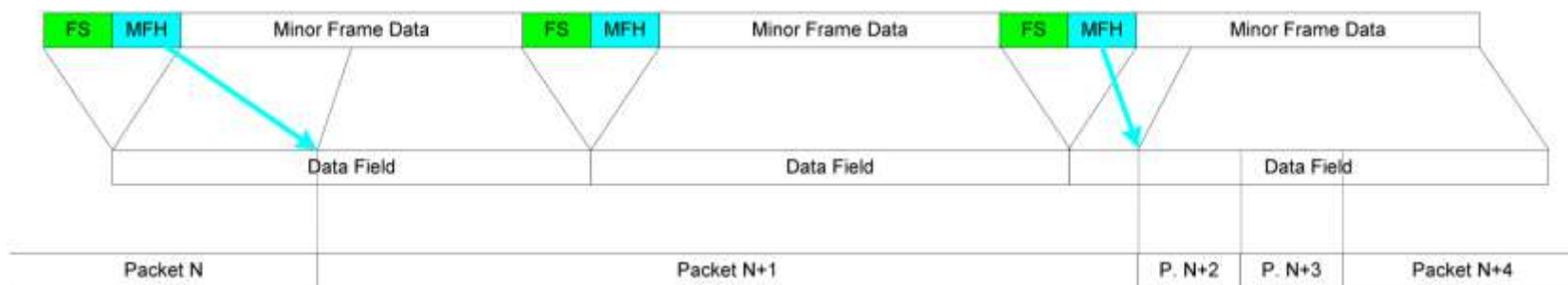
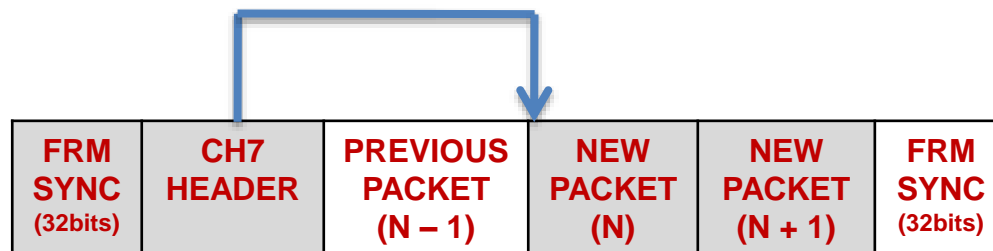
What is it? (cont)



On the ground the CH7 Box can be implemented in software. THIS IS BEING DONE.

Protocol (Simplified)

1	Sync Word (Bits 31...24)
2	Sync Word (Bits 23...16)
3	Sync Word (Bits 15...08)
4	Sync Word (Bits 07...00)
5	Data Byte 1
...	...
4+N*223	Data Byte N*223



FS Frame Sync MFH Minor Frame Header → Offset to the first start of Packet

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Protocol (cont)

- Stream ID
 - 4 bits [adjacent to the frame sync](#)
- Why?
 - All CH7 formats are alike
 - *The freq and bit rates are different*
 - *Not always helpful to the tech on the ground*
 - If each emitter uses a different Stream ID
 - The different CH7 streams now become “**SELF IDENTIFYING**”
 - Program your decom for 36 bits (32 FS + 4 SID bits)
 - Only ‘your’ emitter will lock to your decom.

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Advantages

- Air
 - No **major** costs or infrastructure impacts
 - Takes advantage of existing hardware components
 - Transmitters, Secure boxes, recorders, networks/busses
 - *One new hardware device is required.* (This is not an advantage.)
 - Possible to adapt existing CH10 recorders
- Ground
 - **No** infrastructure changes and minimal added cost
 - Uses existing hardware components
 - Receivers, Secure boxes, Bit Syncs, Decoms
 - (Recovering original stream **may** require new Hardware)

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Advantages (Cont)



- Uses existing Software tools
 - CH10 IP streaming, CH8, 1553, CH4 Decoms, Wireshark
 - iNet
- No new technology or protocols
 - Adaption of existing legacy mature protocols
 - CH9 (TMATS) for setup
 - CH6 for command and control
 - CH10 IP streaming
 - IP protocols
 - UDP
 - Bus monitoring of TCP/IP

Disadvantages

- Growing Pains
 - No CH7 compliant (or compatible) HW is shipping
 - Not much momentum (Official buy in)
 - Ground software development
 - Minimal effort
 - No interoperability testing
 - No 118 Test Methods
 - Data Multiplex committee
- Operational
 - Some added overhead on protocols with their existing overhead
 - CH7 wrapper on top of payloads wrapper
 - It is half duplex
 - Other than bus monitoring TCP/IP is not possible.

Current Status

- IRIG106-15 Standard
 - Final tech-edits completed March 2015
 - Published May 2015??
- Airborne
 - Hardware
 - Support very soon
 - Software
 - CH9 (TMATS), **basic** functionality is included
 - Command and Control, **minimal** functionality

Current Status (Cont)

- Ground
 - Hardware to recreate original airborne Streams
 - Nothing Yet.
 - Hardware solution is **NOT** required
 - CH7 **IS** a standard CH4 SST
 - Decoding and recreating (republish) IP packets is not new technology
 - Software can unwrap the CH7 then unwrap the packets to get the RAW data
 - Vendors are already working on this. (Adapting existing software.)



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Questions?

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