

PENTTEK

*Setting the Standard for Real-Time
Digital Signal Processing*

*Pentek
Seminar Series*

Digital IF Standardization



Report Documentation Page

Form Approved
OMB No. 0704-0188

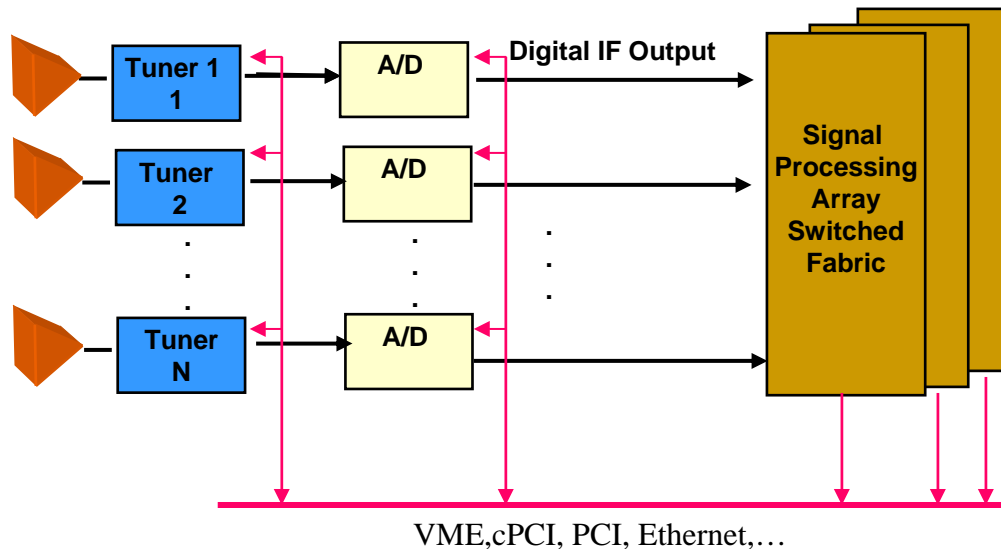
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE 01 FEB 2005		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE Digital IF Standardization				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Pentek				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES See also ADM00001742, HPEC-7 Volume 1, Proceedings of the Eighth Annual High Performance Embedded Computing (HPEC) Workshops, 28-30 September 2004 Volume 1., The original document contains color images.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



Industry Requirement

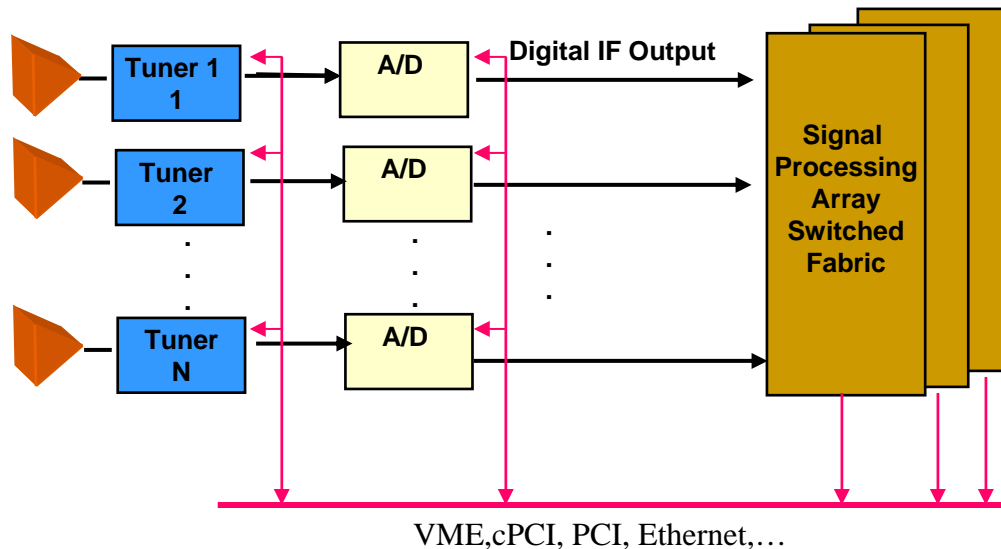
- During the last several years, many communication systems have been using digital methods for the last downconversion or first upconversion stage.
- Often, the Intermediate Frequency (IF) output of an RF downconverter has been digitized using a high speed Analog to Digital Converter.





Transfer Methods

- This digital data stream is then transferred to subsequent processing stages often in a proprietary and application-specific format.
- Ribbon Cables, Backplanes, high-speed serial and optical methods have all been employed.





Desire for Standardization

- Over the last several years, many large government and industrial customers of communication systems have been requesting the purveyors of RF receiver/transmitter equipment, Signal Digitization and Conversion equipment and Signal Processing equipment to standardize on a signal interconnect methodology.
- It is desirable to standardize the format of the “Digital IF” used in these systems so that a marketplace of interoperable products can serve the SIGINT, Aerospace and other communications-oriented communities.



Industry Response

- In 2004, an industry group led by Mercury Computer and DRS-Signal Solutions solicited participation from experienced companies in the signal acquisition and high performance computing community and met with some prominent customers of this technology.
- The result was an initiative to work on a standard to be adopted by the VMEbus Trade Organization (VITA) widely respected in this community
- The resulting on-going effort is VITA Standard 49.



Vita49 Scope of Effort

The goal of the VITA 49.0 Standard effort is to develop a link agnostic protocol format for the transmittal of digital IF data between one or more sources and one or more destinations. This Standard will cover both receive and transmit data paths.



VITA 49: Present Participants

- Applied Signal Technology (P)
- Bustronic Corporation (O)
- Curtiss Wright (P)
- DRS-Signal Solutions (S)
- Digital Receiver Technology (P)
- Dy 4 Systems (O)
- Echotek Corporation (P)
- Foxconn Electronics
- L3 Communications-Integ Sys (O)
- Mercury Computer Systems (S)
- Pentek (S)
- Pentland Systems (P)
- Praxis Engineering Technologies (P)
- SBS Technologies (O)
- Spectrum Signal Processing (S)
- Synergy Microsystems (O)
- Systran Corporation (P)
- Transtech DSP (O)
- Tyco Electronics (O)
- VISTA Controls Corporation (O)
- VMETRO (O)

(S) = Sponsor

(P) = Participant

(O) = Observer

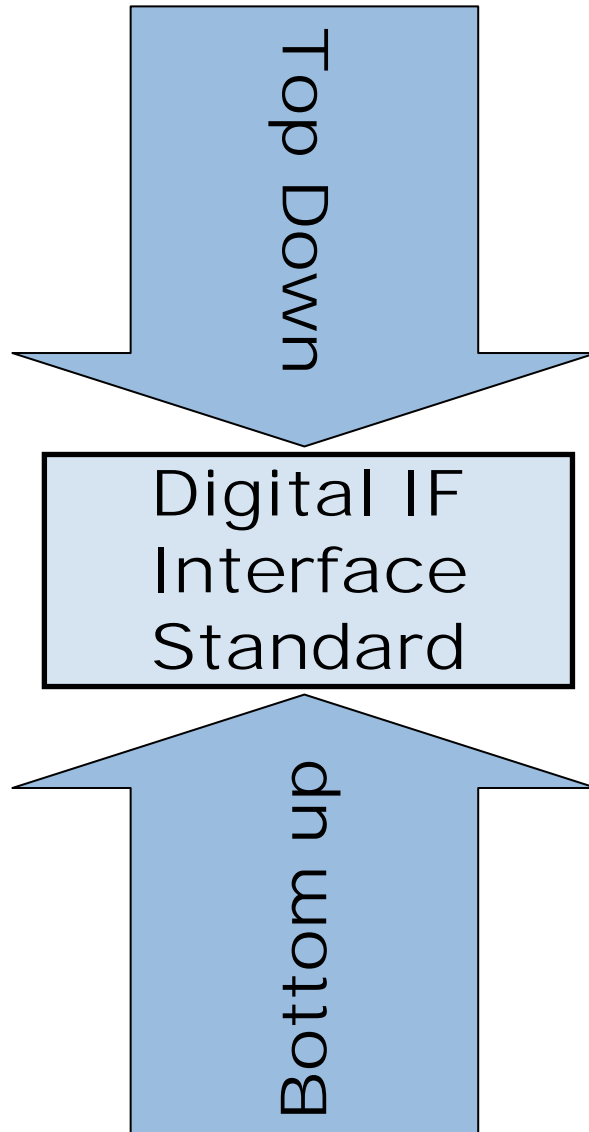


Link Agnostic

- In order to support emerging Switched Fabric interconnects as well as traditional methods we need a portable protocol.
- The protocol must enable necessary communication system requirements such as phase alignment of multiple local oscillators, time stamping and receiver/transmitter control.
- Finally, this protocol must support multiple interconnect methods, such as gigabit links and serial switched fabrics.
- A Packet or Data Frame methodology is the most portable and flexible.



Two Pronged Development



- Top Down
 - System level requirements
- Bottom Up
 - Awareness of physical implementation
 - Try to keep it simple

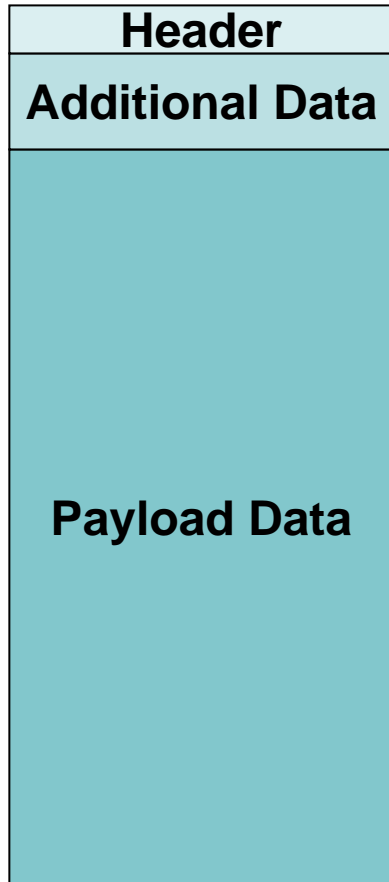


Requirements Overview

- Data Plane Standard Only
 - Augment existing infrastructure for control and status
 - Status information may be passed with Data
- Data Plane
 - High Bandwidth
 - Channel Bonding
 - Minimal Implementation Resources
 - One-way Data Plane
 - Embedded Meta-data
 - Data Framing & Synchronization
 - Error Detection – rely on link standard
 - Low Latency
 - Data Distribution
 - Short and Long distances



Packet Definition is The Standard



- Data Frame can contain:
 - Header: Information required for the correct processing and/or data distribution of the sensor data
 - Additional Data: Information to be associated with this frame of data for downstream processing (meta-data)
 - Payload Data: Actual data for this frame

The work of the VITA 49 Working Group is to define a packet structure that when conveyed by an appropriately high speed interconnect can replace aging methods of configuring a digital communication system.