TELEMETERING STANDARDS COORDINATION COMMITTEE

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INTERNATIONAL FOUNDATION FOR TELEMETERING

TSCC Spring 2018
Chair Report

ITC 2018

November 5, 2018

Renaissance Glendale Hotel

Glendale, AZ

TSCC Membership

- Academia (1)
  - Dr. Michael Marcellin

- Government (5)
  - Mark Bender
  - Albert Gabaldon
  - Myron Moodie
  - Tab Wilcox

  - Richard Graham (*1)

- Industry (9)
  - Scott Brierley
  - Brad Fleury
  - Philip Ellerbrock
  - Wayne Klein
  - Steve Nicolo
  - Sergio Penna
  - Joe Sulewski
  - Gilles Freud

  - Malcolm Weir (*1)

- Ex-Officios
  - Clifford Aggen (IFT Rep)

- Members Emeritus
  - Lee Eccles
  - Merv MacMedan
  - Erwin (Terry) Straehley

(*1) New member, pending letter from superviser

Agenda

- **13:00**   **Call to Order**   **S. Nicolo**

- **13:00**   **Attendance and determination of Quorum**   **W. Klein**

- **13:05**   **Review and Approve Agenda**   **S. Nicolo**
  Approval and review of last Minutes   **S. Nicolo**

- **13:10**   **Officer Reports**
- Chair Report   **S. Nicolo**
  Action Item Review   **S. Nicolo**
-
- Secretary-Treasurer   **W. Klein**
- Financial Status

Agenda (Continued)

- **13:30**   **Committee Reports**

-                      Nominating Committee   **S. Nicolo**

       New nominations/follow-up on members

       New Member Email Vote Results

       Changes Since Last Meeting

-                      Radio Frequency   **S. Brierley**
-                      Telemetry Data Processing (New Name Only)   **B. Fleury**
-                      Networking and Protocols   **S. Nicolo**
-                      Recorder / Reproducer   **M. Buckley**
-                      ETSC Report   **G. Freaud**

       Cyber Security   (New Subcommittee)

       Suspended Subcommittees (Due to lack of activity)

              Transducers

              Coding/Data Compression

Agenda (Continued)

- **14:30**   **Website**
- **14:40**   **Old Business**   **S. Nicolo**
                     Lawrence Rauch Award
- **15:00**   **New Business**   **All**
                     RF Vendors Group
                     Changed in Subcommittees
                     Discussion on time & place for Spring meeting   **S. Nicolo**

- **15:30**   **Adjourn**   **All**
-

Subcommittee Changes

- We did not have a quorum at the Spring meeting. We decided to have an email vote on SC changes. The action was to have an email vote.
  - Voted to suspend Transducer and Coding & Compression Subcommittees due to lack of activity
    - Email Vote Results: 11 out or 13 voted to and all voted to suspend these 2 committees…….. VOTE PASSED TO SUSPEND
  - Voted to add new IA/Cyber Security Subcommittee
    - Email Vote Results: 11 out of 13 voted and 10 out of 11 voted to add new SC. One voted NO. Although we have enough votes to pass this and add new SC, I will hold off until we have a discussion at the meeting.

Subcommittee's & Reports

- CURRENT SUBCOMMITTEE REPORTS
  - Nominating Committee   S. Nicolo (Acting Chair)
  - Radio Frequency   S. Brierley
    - No Actions Proposed
  - Networking and Protocols   S. Nicolo (NEW)
    - No Actions Proposed
  - Recorder / Reproducer   M. Buckley
    - No Actions Proposed
  - ETSC Report   G. Freaud
    - No Actions Proposed

> >

- PERPOSED NEW SC … IA/Cyber Security (Not confirmed yet)
- SUSPENDED SUBCOMMITTEES (Lack of activity)
  - Transducers
  - Coding/Data Compression

Member Summary

Last	First	Association	Member/alternate	Expires	Office	Committee	Last	First	Committee
Bender	Mark	Government	Aerospace Corp	2019	member	radio Freq			
Brierley	Scott	Industry	ULA	2021	Chair	radio Freq/transd	McNatt	William	radiofreq
Ellerbrock	Philip	Industry	Boeing	2023	member				
Fleury	Brad	Industry	Edge Consulting	2020	Chair	Data multiplex / RF	Rob Trepa	Edge	rec/rep;data multi
Gabaldon	Albert	government	China Lake	2021	member	R & R			
Gilles	Freud	Industry	Airbus	2021	member		Mayer	Gerhard	
Klein	Wayne	Industry	Apogee Labs	2022	Treasurer	Network&Protocol	Weaver	Bob	data multi, Net
Marcellin	Dr. Michael	academic	Univ of AZ	2019	member		Creusere	Charles	
Moodie	Myron	Government	SwRI	2019	member	Network&Protocol	Abbott	Ben	N&P
Nicolo	Steve	Industry	GDP Space/Ampex	2020	Chair TSCC	Chair TSCC	Weir	Malcolm	radiofreq
					Chair	Network&Protocol			
						Nominating Committee			
Penna	Sergio	Industry	Embraer	2019	member	Network&Protocol	Correa	Leonardo de Queiroz	
Sulewski	Joe	Industry	L-3	2018	member	Data Multiplex	Dehmelt	Chris	rec/rep, datamult,Net
Wilcox	Tab	government	YPG	2021	member	R & R			
Aggen	Cliff	IFT			IFT				
Eccles	Lee	Emeritus	Boeing		member				
MacMedan	Merv	Emeritus			member	data comp			
Straehley	Erwin	Emeritus			member	data multiplex			

TSCC Activities

- S. Nicolo presented TSCC status and activities at the ETTC Show in Nuremberg Germany June 27, 2018

- TSCC Yearly Report was generated and provided to the IFT June 2018

- We did not have a quorum at the Spring meeting so we decided to have an email vote for new members and to vote on changes to subcommittees.

- Brad Fleury lead and voted on selection of ITC paper for Lawrence Rauch Award

TSCC Activities
Pink Sheet Reviews

- **<u>Telemetry Data Processing Committee</u>**
  - TG-149 Pink Sheet Review: RCC-124 TMATS Handbook :Telemetry Data Processing Committee (TG) Group (October 26, 2018)….. Includes:
    - Updates to Chapter 6 for an example of asynchronous data merge.
    - Addition of Chapter 7 which provides an example of IRIG 106 Chapter 7 in TMATS.
  - TG-158 Pink Sheet Review: IRIG 106 Chapter 7, Packet Telemetry Downlink: Telemetry Data Processing Committee TG Group (November 1, 2018)….Includes:
    - Change proposal to add an optional synchronization pattern to the beginning of each packet, the change proposal to update the language of the document; this should not change the standard, only the descriptions,
    - Change proposal to add optional CRCs to each packet type except fill packets.
    - Also includes updates some to references from chapter 10 to chapter 11.
  - Pink Sheet Review: IRIG 118-18 - Test Methods for Telemetry Systems and Subsystems Volume V, Test Methods for Digital Recorder/Reproducer Systems and Recorder Memory Modules.: Recorder & Reproducer TG Group (September 30, 2018)
    - Distributed for comments

TSCC Activities
Pink Sheet Reviews

- **<u>TM Networks Standards TG Group</u>**
- Pink sheet review – IRIG 106 CH 24,25, 28 : TM Networks Standards TG Group (September 15, 2018 Includes :
  - Chapter 24 and 25 Corrections and Clarifications
    - Corrects a couple of errors / oversights in the initial release
    - Minor errata/wording changes to one paragraph and two table entries
  - Chapter 28 Clarifications
    - TxOp, Queue Management, Link Metrics Management Processing
    - Clarification of how quickly a Radio shall send a "TxOp ID
    - Acknowledgement Report" TLV (28.4.1)
    - Clarification on when to send queue status TLVs and the TLV types associated with Queue Management Processing (28.4.2)
    - Clarification on which TLV types are to be used for Link Metric Processing (28.4.3)
    - MDL Schema v1.0.0 Update: <RadioGroups> Attributes
    - Fixes a workaround being used in order to create a valid schema
    - Created a Radio Group within the schema
    - Updated schema prepared
    - MDL Modification/Failure Report Schema
    - Standardize a format for the file returned during TmNS Configuration Negotiation Protocol
    - Included a sample report, style guide and schema and a paragraph citing these newly defined entities are in Appendix 25B
    - Nested Message Formats
    - Issue: Describe with MDL a format that contains a message length field.
    - MDL schema modified to allow the description of such formats
    - Updated schema and a difference file provided
- IRIG 218 : TMoIP Standard: Presentation on proposed changes was distributed for comments.

TSCC Activities
Pink Sheet Reviews

- **RF Standards TG Group**
- TG161 Pink Sheet Review IRIG 106_17 Chapter 2G Standards for Data Quality Metrics and Data Quality Encapsulation: RF TG Group (September 6, 2018). Includes:
  - Updates v2; Final Review

- TG153 Pink Sheet Review: IRIG118 Vol 2 CH 8 Test Methods FINAL v1 Low Density Parity Check (LDPC Code Tests): RF TG Group. (February 16, 2018)..Includes:
  - Added a new Test Method, 8.4 Receiver/Decoder Latency Time, re-numbered sections after 8.4 2. Incorporated pink sheet comments from original version review which included:
    - Reworded Section 8.2.5.2 and added a note.
    - Specified that "zeroes" are preferred in Section 8.3.5 and made that consistent throughout the document
    - Clarified use of IRIG randomizer in Note in Section 8.3.5.1
    - Section 8.3, clarified the amount of times each test should be run
    - Corrected figure titles in "old" Section 8.5, new Section 8.6

- Pink Sheet Review : IRIG 118 Volume 2 CH 9 Space Time Code (STC) Test Methodology Final: RF TG Group October 15, 2018

Actions (Last Meeting)

- **Send out Email vote for subcommittee changes. (Suspend Transducer & Coding & Compression SC's due to lack of activity and add new IA/Cyber Security SC)…… DONE**

- **Send out email vote on new members (Richard Grahm & Malcolm Weir) …. DONE**

- **S. Nicolo to distribute Shawn Perry's presentation on proposed changes to IRIG 218 ……DONE**

- **S. Nicolo to update member ;list on web site …..(DONE)**

- **Resolve/Update Attendance History Document (Treasurer will then take ownership)…….. OPEN**

- **Need TSCC Co Chair and New Chair …. OPEN**

Actions (NEW)

- **S. Nicolo to add TSCC distribution list to web site**
- **S. Nicolo to get letters from new members supervisers**

TELEMETERING STANDARDS COORDINATION COMMITTEE

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"TSCC Treasurer "
Report – Fall 2018

ITC 2018
November 5, 2018
Renaissance Glendale Hotel
Glendale, AZ

Treasurer Report
for the Period 4/10/18 thru 11/4/18

- INCOME
  - None $ 0.00

- EXPENDITURES (Total) $ (353.71)

  - In Motion Hosting.com (TSCC Website Hosting) $ (191.76)
  - 2018 Best Paper Award Plaques $ (161.95)

- Net Increase (Decrease) in Cash $ (353.71)

- Beginning Cash Balance $ 2319.48

- Ending Cash Balance $ 1965.77

  - Note(s): TSCC account #: xxxxxx2632

TELEMETERING STANDARDS COORDINATION COMMITTEE

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TSCC Fall 2018
Nominating Subcommittee Report

ITC 2018
November 5, 2018

Renaissance Glendale Hotel

Glendale, AZ

Nominating Sub-Committee Membership

- Current Nominating Subcommittee Membership
  - CHAIR …S. Nicolo Acting Chair (Diarmuid Retired)
    - Scott Brierley - United Launch Alliance
    - Wayne Klein – Apogee Labs
    - Stephen Nicolo – GDP Space Systems

Sub-Committee Focus

- The nominating sub-committee shall propose TSCC members and officers for approval by the membership.

- Prospective TSCC members and officers can be nominated by the TSCC membership or by a nominating subcommittee.

- All nominations must be approved by a membership vote.

TSCC Membership Rules

- The TSCC shall have 16 members.
- Adequate representation shall always exist from the diverse groups constituting the telemetry community
- Representatives of government and commercial entities shall each constitute a minimum of one-third (1/3) of the regular TSCC Membership
- The remaining one-third (1/3) may include, but is not limited to those in commercial, governmental, and academic organizations
- Membership by representatives of non-US entities shall not exceed 25% of the total regular membership

TSCC Membership Terms

- TSCC Membership Terms are for five years
  - Terms are staggered so that the terms of 20% (rounded to the nearest integer) of the regular membership end each year
  - Members may be re-nominated for additional terms by the nominating sub-committee.

- Expirations – Fall 2018:
  - Joe Suleski: Joe would like to serve for an additional term.
    - Must vote Fall Meeting

TSCC Membership

- Academia (1)
  - Dr. Michael Marcellin

- Government (5)
  - Mark Bender
  - Albert Gabaldon
  - Myron Moodie
  - Tab Wilcox

  - Richard Graham (*1)

- Industry (9)
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  - Brad Fleury
  - Philip Ellerbrock
  - Wayne Klein
  - Steve Nicolo
  - Sergio Penna
  - Joe Sulewski
  - Gilles Freud

  - Malcolm Weir (*1)

- Ex-Officios
  - Clifford Aggen (IFT Rep)

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MacMedan	Merv	Emeritus			member	data comp			
Straehley	Erwin	Emeritus			member	data multiplex			

Membership Changes

- Voting on Members:
  - Fall 2018 Voting
    - Joe Sulewski (Term is up Fall 2018)
  - Email Voting New Members: 11 of 13 members voted and all voted YES.
    - Richard A. Graham Jr., Electrical Engineer, NSWC – Corona…Submitted by Albert Gabaldon
    - Malcolm Weir, Chief Technology Officer at Ampex … Submitted by Steve Nicolo

- Voting on Alternates:
  - None

- Alternates still needed for:
  - Mark Bender
  - Albert Gabaldon
  - Tab Wilcox

- Retiring members:
  - None

Future Membership Slots

- We had 13 full members in the Spring. We voted in 2 new members 1 government and 1 Industry. Need 1 Government or 1 Academia member to maintain our approx 33% split between industry, academic and government.

- Possible Government Nominees:
  - Kevin Bossoletti > Said no but recommended **Brian Platt**
  - Jack Salisbury
  - Scott Kujiraoka

TSCC Officers

- Officers shall serve for a two year term of office
  - The term of office shall begin at the start of the TSCC Year in even calendar years
  - Traditionally the Vice-Chair succeeds to the Chair's position to fulfill a two year term as Chair
  - The Secretary-Treasurer may be re-elected
  - **Officer Terms up December 31, 2018**
- Current Officers:
  - Chair – Steve Nicolo
  - Vice-Chair - Vacant!!!!!!!!
  - Secretary-Treasurer – Wayne Klein
- Subcommittee Chairs
  - All positions full

Open Actions

- Have 1 open position should be government or academic.
- Need TSCC Vice-chair and now Chair
- Committees
  - Subcommittee Chairs
    - Nominating Committee Chair Needed
    - IA/Cyber Security (Pending new committee)
  - Alternates still needed for:
    - Mark Bender
    - Albert Gabaldon
    - Tab Wilcox

TELEMETERING STANDARDS COORDINATION COMMITTEE

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RF Subcommittee Report – Fall 2018

ITC 2016
November 5, 2018
Renaissance Glendale Hotel
Glendale, AZ

Sub Committee Membership

- Scott Brierley, Chairman
- Members:
  - Johnny Pappas
  - Mark Bender
  - Mark Dapore
  - Brad Fleury
  - Lloyd Lautzenhiser
  - Bill McNatt
  - Rich Siegal
  - Brad Oney
  - James Carwell

Sub-Committee Focus

- RF Subcommittee reviews standards dealing with the Radio Frequency (RF) telemetry link
- Current standards
  - RCC IRIG-106
  - RCC IRIG-118
  - RCC RF Handbook
  - CCSDS-401
  - CCSDS-411
  - SGLS
  - STDN
  - 1451.5

RF Vendors Working Group

- Following the 2018 Spring TSCC meeting the RF Vendors working group presented at the RCC

RF Vendors Working Group

- Suggested the need for three items that would facilitate interoperability of different supplier's equipment at the Range:
  - DQM and DQE standards and test methods
    - Data Quality Metric
    - Data Quality Encapsulation
  - Test Input file to generate signal for testing receivers
  - Adaptive Equalization test methods

DQM

- DQM (Data Quality Metric)
  - Output from the receiver that represents probability of bit error in the current output stream
  - DQM used by best source selector to determine which source is most likely to be correct
    - Used when multiple sources are available to provide weighted acceptability of the bits

DQM Testing

- Test to be preformed with the following calibrated impairments
  - AWGN (Additive White Gaussian Noise)
  - Transient Response
    - Becomes less useful if too many bits are averaged into value
  - Static Mulitipath
  - Adjacent Channel Interference
- Should be tested at multiple bit rates and multiple modulations
- Accuracy compares BEP (derived from DQM) to measured BER

DQM Responsiveness

- Responsiveness measured by observing the series of DQM values during a step change in the RF signal quality
  - Important to make estimate quickly
  - Give the best source the best chance of getting the data correct

DQM

- Log likelihood ratio is a "shareholders" vote
  - Instead of each source getting one vote whether the bit is one or zero, it is a "shareholder" vote
  - Each source is weighted, so source with better probability of getting the bit correct gets the more votes

- Soft decision has a different math than log likelihood ratio, but the end result is the same: estimate of the probability is a bit is correct

- Time correlation of the bits is another issue that can be solved by each vendor

DQE

- Data Quality Encapsulation
  - Standard needed for the receiver to provide DQM data to the best source selector

- DQE
  - 12 Bits undefined to be used by each supplier
  - 16 bit DQM
  - N bits payload data.

Test Input File

- Purpose: Government obtain a set of waveforms to provide to suppliers
- Generate a set of waveforms to:
  - Aid new development, and
  - Publish performance of equipment
    - Performance in noise
    - Check Synchronization
    - Unbalanced signals

- No waveforms for Tier 0, 1, and 2
  - past the need date

Test Input File

- Request the waveforms be public internet accessible

- Format needed – I and Q floating point
  - up to each use case to convert it

- Government Validated/Approved
  - Academia, Government, or industry generated
  - Could BYU grad student generate and supply the care and feeding of the file?

Test Input File

- Reference Waveforms:
  - Waveforms that are representative of real mission anomalies
  - Time Delay, Phase Delay carriers
  - Different amplitude
  - Different PRN lengths
    - 11 minimum
    - 15 desired
  - Oversampled, samples per bit minimum
    - 6 minimum
    - 8 desired

Test Input File

- Suppliers should also ensure equipment is tested in real-word situations
  - Lesson from Volkswagen Jetta

Adaptive Equalization

- Objective: Quantify the impact of the adaptive equalizer on the output data stream

- Prerequisite: Define Standard multipath channels, corresponding to test article status
    - Static
    - Taxi
    - Take off and Landing
    - Far away at low elevation (over land or sea water)

Adaptive Equalization

- Each multipath channel is defined by
  - Number of paths
  - Amplitude of each path
  - Delay of each path
  - Doppler spread of each path
  - Phase shift of each path

Adaptive Equalization

- Adaptive equalizer performance evaluation
  - Start out with baseline BER of 10^{-5}, no multipath, no equalizer, record SNR1 in dB
  - Turn on multipath, record BER1 ($0.5 < \text{BER1} < 10^{-5}$)
  - Turn on equalizer, measure BER2 ($0.5 < \text{BER2} < 10^{-5}$)
  - Compute BER benefit = log(BER1/BER2)
    - Benefit<4.7
    - 4.7 is $\log(.5/10^{-5})$
    - higher is better
  - Increase SNR until BER drops to 10^{-5}, this is SNR2
  - Compute "multipath cost" = SNR2-SNR1
    - Multipath cost is the additional SNR required to get back to 10^{-5} after the equalizer has mitigated the multipath
    - Lower is better

Adaptive Equalizer – Acquisition

- After BER benefit and multipath cost have been established run repeated acquisitions
  - Turn on multipath and equalizer
  - Let receiver operate with no RF input for at least 5 seconds
  - Apply multipath corrupted RF to receiver at SNR2, record BER
  - Repeat many times (>1000)
  - Count number of times BER > 3×10^{-5}, these are false acquisitions
    - 3×10^{-5} somewhat arbitrary number
- Calcuated probability of false acquisitions as
  - Pfa = number of false acquisitons/number of trials

Significant Activity

- Pink sheet review
  - IRIG 118 Chapter 9 TEST PROCEDURES FOR SPACE-TIME CODING CAPABLE HARDWARE
  - Responses were due 10/15/2018

Open Actions

- Actions: none

Committee Members

- Brad Fleury – Director Edge consulting and sales

- Alternate – Rob Trepa, Director Edge Consulting and Sales

Sub-Committee Standards

- Current standards
  - IRIG-106 -17
  - Telemetry App's Handbook.
    - TMATS use cases, complete but updates are made as needed
    - RCC XML handbook for IHAL and DDML XML

Sub Committee Membership

Jon Morgan – RCC lead EAFB
Joe Sulewski – L-3 Communications
Joe Merritt – RT Logic
Jack Sheldon
Erwin Straehley
Duane Wheaton

Sub-Committee Focus

- Minimal activity since Spring meeting
- Name change to Telemetry Data Processing
- Pink Sheets circulating TG-158
- Currently working an update to the TMATS handbook. Adding examples
- Jon Morgan is hosting a panel Tuesday at 330. Updated Status on the Telemetry Range Support Aircraft

Open Actions

- Support RCC ongoing efforts:
  - TMATS Handbook releases
  - IRIG standards
- Support RCC –TG Telemetry Data Processing telecons and RCC meetings.

TELEMETERING STANDARDS COORDINATION COMMITTEE

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TSCC Fall 2018 Networks Subcommittee Report

Sub Committee Membership

- Steve Nicolo, Chair – GDP Space Systems, Ground Telemetry (NEW CHAIR)
  - Ben Abbot, Southwest Research Institute
  - Rich Hoffman, GDP Space Systems
  - Gary Thom, Delta Information systems
  - Myron Moodie, Southwest Research Institute
  - Wayne Klein, Apogee Labs
  - Fil Macias, White Sands Missile Range
  - William Malatesta, NAVAIR
  - Hyong Yi, Curtiss-Wright Controls, Avionics and Electronics
  - Robert Weaver, Apogee Labs
  - Chris Dehmelt, L3 Telemetry – East
  - Joe Sulewski, L3 Telemetry
  - Malcolm Weir, Ampex
  - Sergio Penna, Embraer
  - Dave Buckley, Curtiss-Wright Controls

Subcommittee Focus

Standard	Location	Contact
RCC IRIG-106 Chapters21-28	irig106p2-chpt21-28.zip	Secretariat Range Commanders Council U.S. Army White Sands Missile Range New Mexico 88002-5110
SCPS	http://www.scps.org	http://www.scps.org/html/contact_points.html
CCSDS	http://public.ccsds.org/default.aspx	http://public.ccsds.org/about/contact_us.aspx
TCP (Transmission Control Protocol)	http://www.faqs.org/rfcs/rfc793.html	
UDP (User Datagram Protocol)	http://tools.ietf.org/html/rfc768	
SNMP (Simple Network Management Protocol)	http://tools.ietf.org/html/rfc3411	http://tools.ietf.org/html
EEE-1588 (A Precision Clock Synchronization Protocol for Networked MEasurement and Control Systems)	http://ieee1588.nist.gov	http://www.ieee-ims.org/site/index.php
FTP (File Transfer Protocol)http://www.ietf.org/rfc/rfc959.txthttp://tools.ietf.org/html	FTP (File Transfer Protocol)http://www.ietf.org/rfc/rfc959.txthttp://tools.ietf.org/html	FTP (File Transfer Protocol)http://www.ietf.org/rfc/rfc959.txt http://tools.ietf.org/html

TSCC Activities
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        - TxOp, Queue Management, Link Metrics Management Processing
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        - Standardize a format for the file returned during TmNS Configuration Negotiation Protocol
        - Included a sample report, style guide and schema and a paragraph citing these newly defined entities are in Appendix 25B
        - Nested Message Formats
        - Issue: Describe with MDL a format that contains a message length field.
        - MDL schema modified to allow the description of such formats
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TSCC Activities

- IRIG 218 : TMoIP Standard: Status from Shawn Perry 11/5/18
  - The standard will be published this year.
  - At our TTG meeting in September, we made two changes to what was briefed previously.
    1. Large Packets:For the rare case of a large (greater than MTU) payload shaped to TM minor frames or DQE frames, we added a flag bit to indicate that the packet is a continuation packet (fragmented payload).
    2. Time Stamp: The timestamp is 32 bits of seconds and 30 bits of nanoseconds (PTP timestamp) referenced to the Jan 1 1970 epoch. We also decided that we really wanted to help move Ranges toward 1588 timing and felt the need to include that option in the standard. Therefore, there will be a flag bit as well to indicate whether the timing source is UTC or TIA based. That way, if a vendor chooses to implement 1588 timing, the receiving side will know that they need to adjust for leap seconds on that stream. It is assumed that a user input will be the source of that leap second adjustment and can be changed each time a leap second is added.

Open Actions

- Expand on standards focus list

Sub Committee Membership

- Mark Buckley (Telspan Data), Chairman
- Albert Gabaldon (NAVAIR), Alternate Chairman
  - Balázs Bagó (Zodiac)
  - Bob Baggerman (AVTest)
  - Paul Carrion (Calculex)
  - Chris Dehmelt (L-3 Comm Telemetry East)
  - Justin Denning
  - Paul Ferrile (ATAC)
  - Tim Gatton (?)
  - Dan Green (Zodiac)
  - Eric Lamphear (Telspan Data)
  - Mike Lockard (EMC Corp)
  - Hung Mach (Boeing)
  - Doug Novak (?)
  - Johnny Pappas (Zodiac)
  - (?) Jason Phillips (RT Logic)
  - Christian Rueck (Databus Tools)
  - Rob Trepa (Edge Consulting)
  - Malcolm Weir (Ampex)
  - Craig Wierzbicki (TTC)
  - Rick Williams (SDS)
  - Steve Proudlock (NetAcquire)

Sub-Committee Focus

- ■ Data Recorders, Ground and Airborne

- ■ Standards in Place
  - IRIG 106-17 – Range Commanders Council (RCC) Telemetry Standards

    http://www.wsmr.army.mil/RCCsite/Pages/Publications.aspx
  - STANAG 4575 – North Atlantic Treaty Organization (NATO) Standard Agreement (STANAG) – NATO Advanced Data Storage Interface (NADSI) Allied Engineering Documentation Publication (AEDP)

    http://www.nato.int/STRUCTUR/AC/224/standard/4575/4575.htm
  - ANSI INCITS 175-1999 (R2004) 19mm Type ID-1 Recorded Instrumentation Digital Cassette Tape Format (revision and redesignation of ANSI X3.175-1990 (R1995)
  - MIL-STD-2179 – Helical Digital Recording Format For 19-MM Magnetic Tape Cassette Recorders/Recorders

Significant Activity

- RCC Telemetry Group Recorder & Reproducer Committee
  - IRIG 106-19 Chapters 6/9/10/11 Pink Sheets
    - Waiting for public release approval
- STANAG 4575, AEDP-6 Ratification
  - No update

Significant Activity
RCC Document 106-19 Ch's 6,9,10,11

- TSCC R&R to take a more significant roll in CR reviews & recommendations
  - Help ease the TG R&R work load & approval process
- 2019 approved CR's
  - (Following three pages)

R&R CRs for 2019

CR No	Description	Status	
tmpRR_16_CR-003 **(CR)**	PCM (not) Inverted	Clarification, Text Added	**Pink sheet**
tmpRR_17_CR-010	Update S-Group	Implemented	**Pink sheet**
tmpRR_17_CR-011	New PCM Formats	Implemented	**Pink sheet**
tmpRR_18_CR-005 **(CR)**	Simple TMATS Corrections, R-Group	Typos, Clarifications	**Pink sheet**
tmpRR_18_CR-006 **(CR)**	Simple TMATS Corrections, P-Group	Typos, Clarifications	**Pink sheet**
tmpRR_18_CR-011 **(CR)**	Secondary Header	Typos, Clarifications	**Pink sheet**
RR_18_CR-012 **(CR)**	Parallel Data Type	Typos, Clarifications	**Pink sheet**
RR_18_CR-013 **(CR)**	TMATS Streaming packets	Typos, Clarifications	**Pink sheet**
RR_18_CR-014 **(CR)**	Data Stream Format 3	Typos, Clarifications	**Pink sheet**

R&R Working/Closed CRs

CR No	Description	Status	
RR_16_CR-001 **(CR)**	PCM Rewrite	**CLOSED, Judiciously**	
RR_17_CR-001	Ver 2 Packet Header	CANCLED	
tmpRR_17_CR-002	MDL Header Data Type	Working	
tmpRR_17_CR-003	Fix Video Formats	Working	
tmpRR_17_CR-004	Distribution Statement	Working	
tmpRR_17_CR-005	Add PN fields	Working	
RR_17_CR_006 **(CR)**	UART, First Packet Flag	Working	
RR_17_CR_007	CoAP-Jason add to CH6	~~CANCLED~~ transferred	
RR_17_CR_008	HDLC	CANCLED	
RR_17_CR-009	New EtherNet, FC	Proposed	

R&R Working/Closed CRs

CR No	Description	Status	
RR_16_CR-001 **(CR)**	PCM Rewrite	**CLOSED, Judiciously**	
RR_17_CR-000	New CR number	Implemented	
RR_17_CR-001	Ver 2 Packet Header	CANCLED	
tmpRR_17_CR-002	MDL Header Data Type	Working	
tmpRR_17_CR-003	Fix Video Formats	Working	
tmpRR_17_CR-004	Distribution Statement	Working	
tmpRR_17_CR-005	Add PN fields	Working	
RR_17_CR_006 **(CR)**	UART, First Packet Flag	Working	
RR_17_CR_007	CoAP-Jason add to CH6	~~CANCLED~~ transferred	
RR_17_CR_008	HDLC	CANCLED	
RR_17_CR-009	New EtherNet, FC	Proposed	

Open Actions

- TSCC –
  - Meeting on 8 Nov
  - 1 to 4PM, Cascade A
  - Agenda
    - CH10 in a networking world
    - Metadata hooks into a post/real-time CH10 architecture

Sub Committee Membership

- Gilles FREAUD, Chairman
- Alternate Chairman (TBD)

- A team of 25 people interested to relaunch a working group:

Gerhard Mayer GM Consulting	Steve Lyons Qinetiq	Sergio Penna Embraer	Werner Lange Lange Electronics	Marc Faber ZDS	Renaud Urli Airbus H
Christian Herbepin Airbus H	Marc Seznec Airbus H	Heiko Koertzel Airbus DS	Florent Buttigieg Dassault Aviation	Ghislain Guerrero ZDS	
Bernhard Koderer Airbus DS	Gilles Fréaud Airbus C	Guillaume Duponchel ZDS	Pedro Rubio Airbus DS	Jean Claude Ghnassia ICTS-3AF	
Didier Schott ArianeGroup	David Cumer Airbus C	Franck Rochette Dassault Aviation	Diarmuid Corry Continuity Cons.	Guillermo Martinez Airbus DS	
Luc Falga Airbus C	Stürzer Quiring Airbus DS	Balazs Bago ZDS	Manuel Sanchez Inta	Francisco Jimenez Airbus DS	

and now about 15 people more….

Significant Activity_1

- 2018 the year to Re-energyse ETSC

- We chose a new name:

EITTS
European Initiative for Test & Telemetry Standardization

Sub-Committee Focus

- 1°) Perimeter of EITTS:

   We are an open international group mainly focused on flight tests

- 2°) Missions :

- Analyse, review, coordinate, disseminate information concerning Standards (TSCC, RCC IRIG, IEEE, industry standards…)

- Develop and influence new International standards

- Represent the interest of transport, aeropsace and defence industry (users and manufacturers advisory group)

Significant Activity_2

- We are currently defining the topics:

  * Wireless

  * Telemetry link(including Radio frequency & Spectrum + Usage of low orbital satellite)

  * Smart sensors

  * Data & Video processing & compression

  * Data Storage

  * Data protocols & ICD format

Open Actions

- The way of working:

* Open meeting once a year at ETTC

* During the year : Collaborative work by Phone calls/webex and collaborative tool

* At least one formal Webex per quarter

* Keep the link with TSCC

- The real challenge: Relaunch the topics & Stay alive

OLD BUSINESS

TSCC – Lawrence Rauch Telemetry Standards Award

- Brad Fleury lead the team on the selection of the best paper.

- The criteria for submittal by Session Chairs is as follows:

  - Subject matter of the paper must be principally about telemetry standards or a telemetry standard. It is not enough to merely mention a standard in the paper. Any paper whose subject is not telemetry standards is not eligible. This may mean no award is made in certain years.

- There were 7 papers submitted and one was the clear winner

TSCC – Lawrence Rauch Telemetry Standards Award

- Winner was paper #76:

INTRODUCING TACL—A PROPOSAL FOR A NEW STANDARD T&E CONSTRAINT LANGUAGE
by
JakubMoskal1,AustinWhittington2,MitchKokar1,andBenAbbott2

1VIStology,Inc.,Framingham,MA
2SouthwestResearchInstitute,SanAntonio,TX

- The award will be given at the Award Luncheon on Wednesday by Steve Nicolo