# IEEE 1588 Conformity Alliance
## Organization and Technical Overview

**Bob Mandeville**

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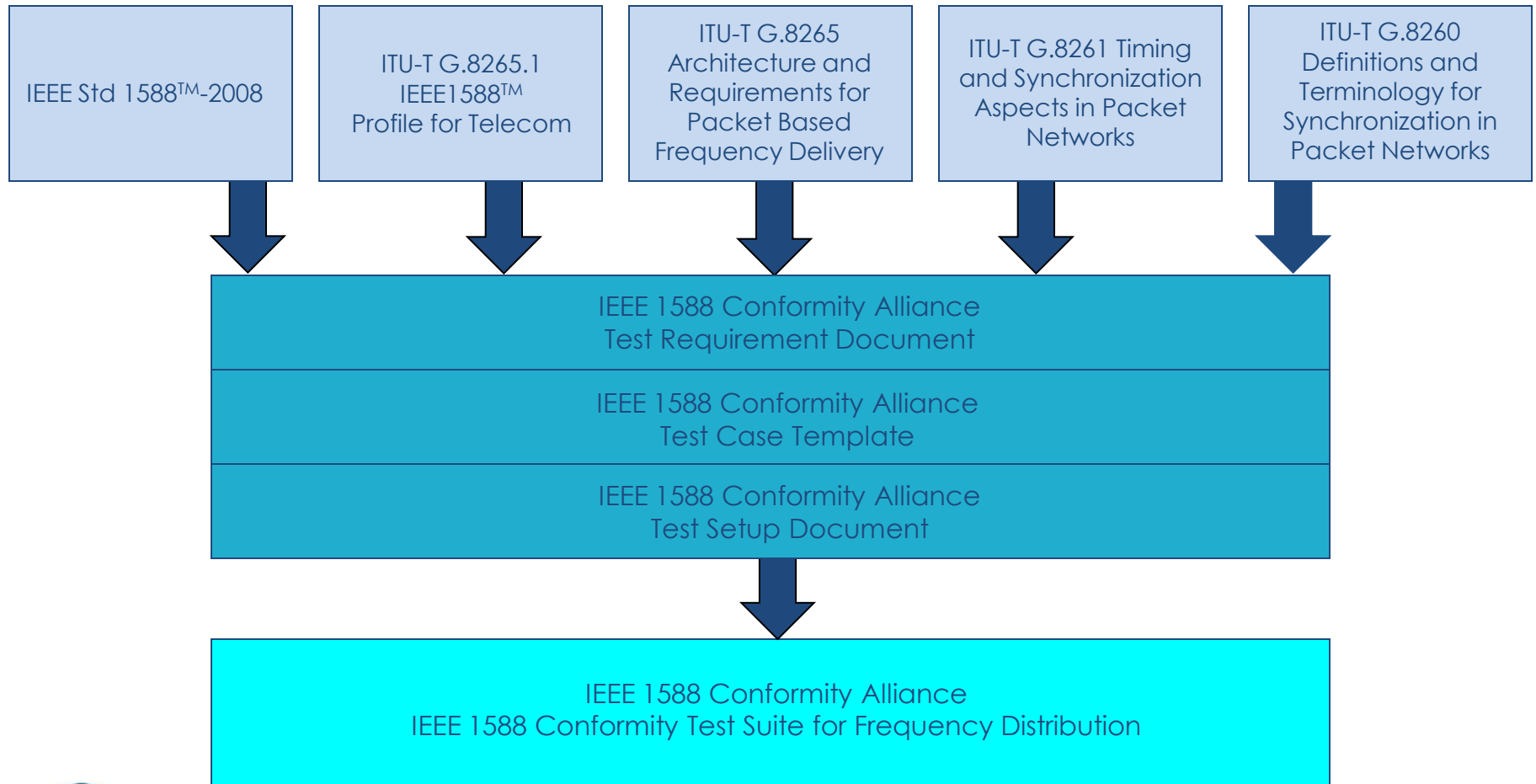# IEEE 1588 Conformity Alliance

- IEEE Conformity Assessment Program (ICAP) created within the IEEE-ISTO has the mission to promote the IEEE 1588 "Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems" as the de-facto standard for synchronization delivery over packet networks.

- To accomplish this goal, the Alliance is developing the industry's first IEEE 1588 certification program to recognize the ability of specific implementations to meet the conformance requirements with the IEEE 1588 standard.  Additionally, the 1588 Conformity Alliance will be the definitive industry resource for information on synchronization delivery.

- The Alliance will develop a library of both technical and business-oriented material to create awareness within the industry of the benefits and advantages of adopting the 1588 standard. The Alliance will build industry awareness by presenting its library of expert knowledge on synchronization delivery through a variety of outlets including via our web and through participation in various industry conferences and events throughout the year.

# IEEE 1588 Conformity Alliance

# Certification Test Suite Framework

| IEEE Std 1588™-2008 | ITU-T G.8265.1 IEEE1588™ Profile for Telecom | ITU-T G.8265 Architecture and Requirements for Packet Based Frequency Delivery | ITU-T G.8261 Timing and Synchronization Aspects in Packet Networks | ITU-T G.8260 Definitions and Terminology for Synchronization in Packet Networks |

**IEEE 1588 Conformity Alliance
Test Requirement Document**

**IEEE 1588 Conformity Alliance
Test Case Template**

**IEEE 1588 Conformity Alliance
Test Setup Document**

**IEEE 1588 Conformity Alliance
IEEE 1588 Conformity Test Suite for Frequency Distribution**

# Committee of Experts

- The IEEE 1588 Conformity Alliance Committee of Experts reviews and recommends the Test Requirement, Test Case Template and Test Setup documents for approval and the Certification Test Suite for ratification by the IEEE 1588 Conformity Alliance Board of Directors

- Formation of Committee of Experts
- Members of the IEEE 1588 Conformity Alliance Committee of Experts are invited by the Board of Directors and composed of notable experts in the field of synchronization including:
    - editors of source specifications
    - chairs and co-chairs of groups developing source specifications
    - principal contributors to source specifications
    - early implementers from vendor community
    - early adopters from service provider community
    - experts in the field of testing
- John Eidson, Jean-Loup Ferrant, Mike Gilson, Charles Curry, Malcolm Paterson, Silvana Rodrigues, Chip Webb, Stefano Ruffini, Tim Frost, Sebastien Jobert, Peter Roberts, Michel Ouellette, Michael Mayer, Kishan Shenoi, Han Li, Dave Tonks, Leonid Goldin

# Timeline Projection

- The calendar of activities of the Expert Committee is projected as follows:

| Test Requirement, Test Case Template & Test Setup Drafts review: comments and calls | Certification Test Suite development by Test Lab Editor | Certification Test Suite 1st Draft review: comments and calls | Certification Test Suite revisions by Test Lab Editor | Certification Test Suite 2nd Draft review: comments and calls |
|---|---|---|---|---|
| 5 wks | 5 wks | 5 wks | 3 wks | 4 wks |

# IEEE 1588 Conformity Test Suite for Frequency Distribution

Test Suite Scope

- Modes of operation for the exchange of PTP messages
- PTP protocol mapping
- PTP message rates
- Unicast transmission and negotiation
- Alternate BMC algorithm
- Slave protection functions
- Clock Identity and PTP message format
- Packet Slave Clock performance

- Phase and time distribution, boundary and transparent clocks, the use of multicast messages, management mechanisms and security aspects are for future consideration.
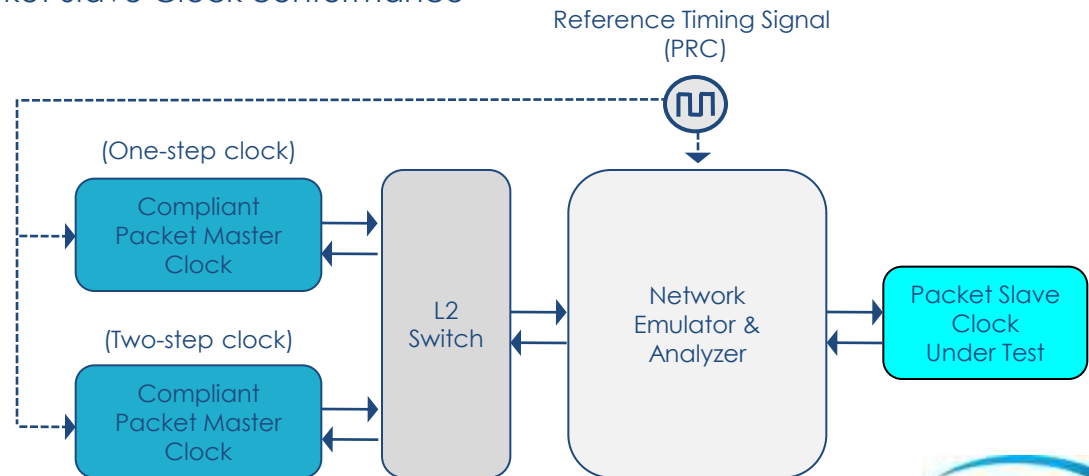
# Packet Master Clock Conformance

- The requirements for Packet Master Clock conformance are defined in the following standard and recommendation:
  - **IEEE1588™-2008**, Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems
  - **ITU-T G.8265.1**, PTP Profile for Frequency Distribution without Timing Support from the Network

- Based on each requirement, one or more test cases are developed in the Test Suite:
  - Test cases to verify **one-step** Packet Master Clock conformance
    - Providing one-way timing transfer
    - Providing two-way timing transfer
  - Test cases to verify **two-step** Packet Master Clock conformance
    - Providing one-way timing transfer
    - Providing two-way timing transfer
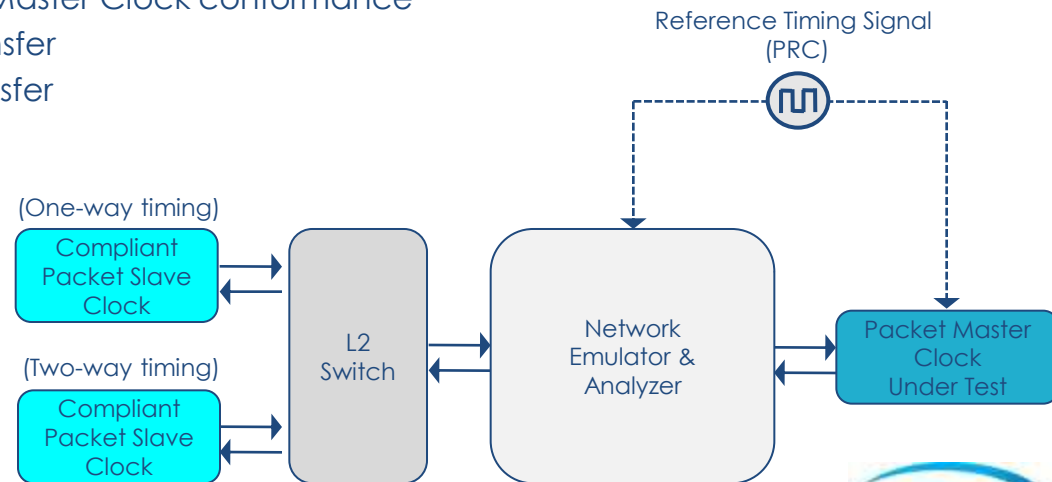
# Packet Slave Clock Conformance

- The requirements for Packet Slave Clock conformance are defined in the following standard and recommendation:
  - **IEEE1588™-2008**, Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems
  - **ITU-T G.8265.1**, PTP Profile for Frequency Distribution without Timing Support from the Network

- Based on each requirement, one or more test cases are developed in the Test Suite:
  - Test cases to verify **one-way** Packet Slave Clock conformance
    - Handling one-step clock
    - Handling two-step clock
  - Test cases to verify **two-way** Packet Slave Clock conformance
    - Handling one-step clock
    - Handling two-step clock

Reference Timing Signal (PRC)

(One-step clock)

Compliant Packet Master Clock

(Two-step clock)

Compliant Packet Master Clock

L2 Switch

Network Emulator & Analyzer

Packet Slave Clock Under Test

# Packet Slave Clock Performance

- Performance tests based on the measurement guidelines for packet-based methods described in **ITU-T G.8261** Appendix VI

- Testing consistency and repeatability achieved by use of Network Emulators and PDV profiles

- Elements currently under study by the IEEE 1588 Committee of Experts
- Approach for capturing PDV profiles (topology, sampling method)
- Disturbance traffic models (packet size profiles)
- Disruptive network events (PDV frequency, network congestion, outages, equipment failure, etc)
- Performance test objectives based on applications such as:
  - Packet Slave Clock required to synchronize equipment tolerant to sync mask
  - Packet Slave Clock required to synchronize equipment tolerant to traffic mask
  - Packet Slave Clock required to synchronize co-located base stations
  - Packet Slave Clock integrated in a base station
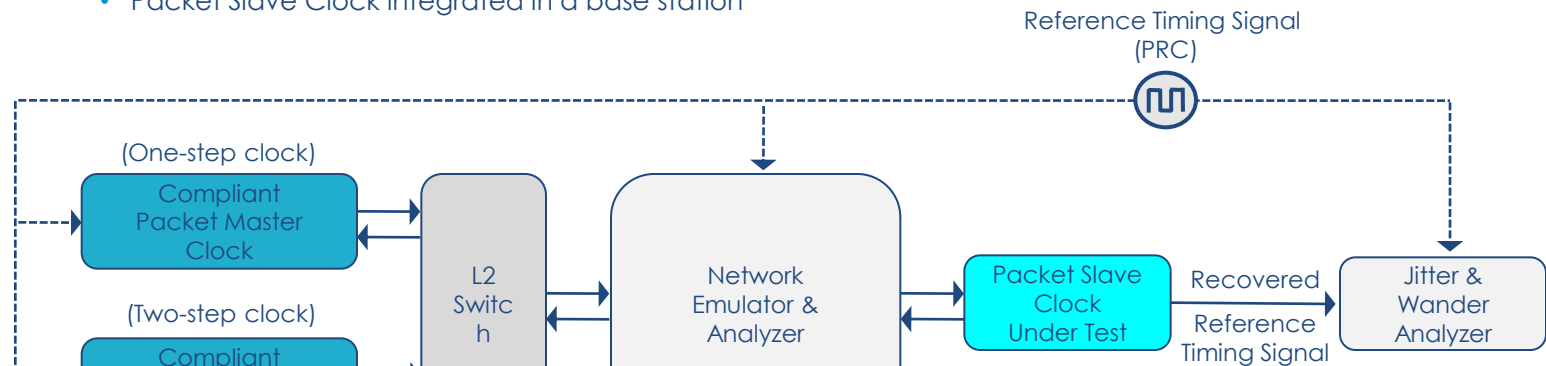
# Thank You

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