



# Emcore Corporation

## Modification of Comprehensive Stressed Receiver Sensitivity and Overload Test for Verification of Equalizer Adaptation Time

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## Summary of the Problem

- **The IEEE 802.3 Legacy**
  - Ethernet Has Been Successful Because the IEEE 802.3 Working Group Has Delivered Standards That Work – If A System Conforms to the Standard, It Will Interoperate With Other Systems That Conform to the Standard Over the Media Specified In the Standard
- **Fundamentally, 10GBASE-LRM Systems Must:**
  - Function With High Confidence Over Channels With Distinctly Different Impulse Responses
  - Adapt to Channels With Transfer Functions That May Change Substantially Over Time
- **Good Progress Has Been Made on Addressing Static Channel Characteristics And Test Requirements to Confirm Links Will Work Under Non-Time-Varying Conditions**
- **Some Progress Has Been Made on Understanding Dynamic Channel Characteristics, But More Is Probably Required**
- **As Written, The Draft Makes No Normative Statements Regarding Adaptation Time**

- **Early Proposal to Link Required Performance to GR-63-CORE**
  - GR-63-CORE Addresses Office Environments
  - Desire to Link Performance to an Industry Standard
  - Very Few Standards Exist on Operational Vibration & Shock
- **Some Experiments Performed On Dynamic Channel Characteristics Using Operational Vibration Specifications from GR-63-CORE**
  - Limited Data Set
  - Stronger Affect With Low-Frequency, High-Amplitude Vibrations
  - Some “Gearbox” Effect – Estimated at 3X Vibration Frequency
  - Modal Noise Penalty to Include Expected High-Frequency Variation
- **Dynamic Modeling Effort Smaller in Scope Than Static Channel Work**
- **In Summary:**
  - Limited Data on and Modeling of Dynamic Channels to Validate Adaptability Assertions

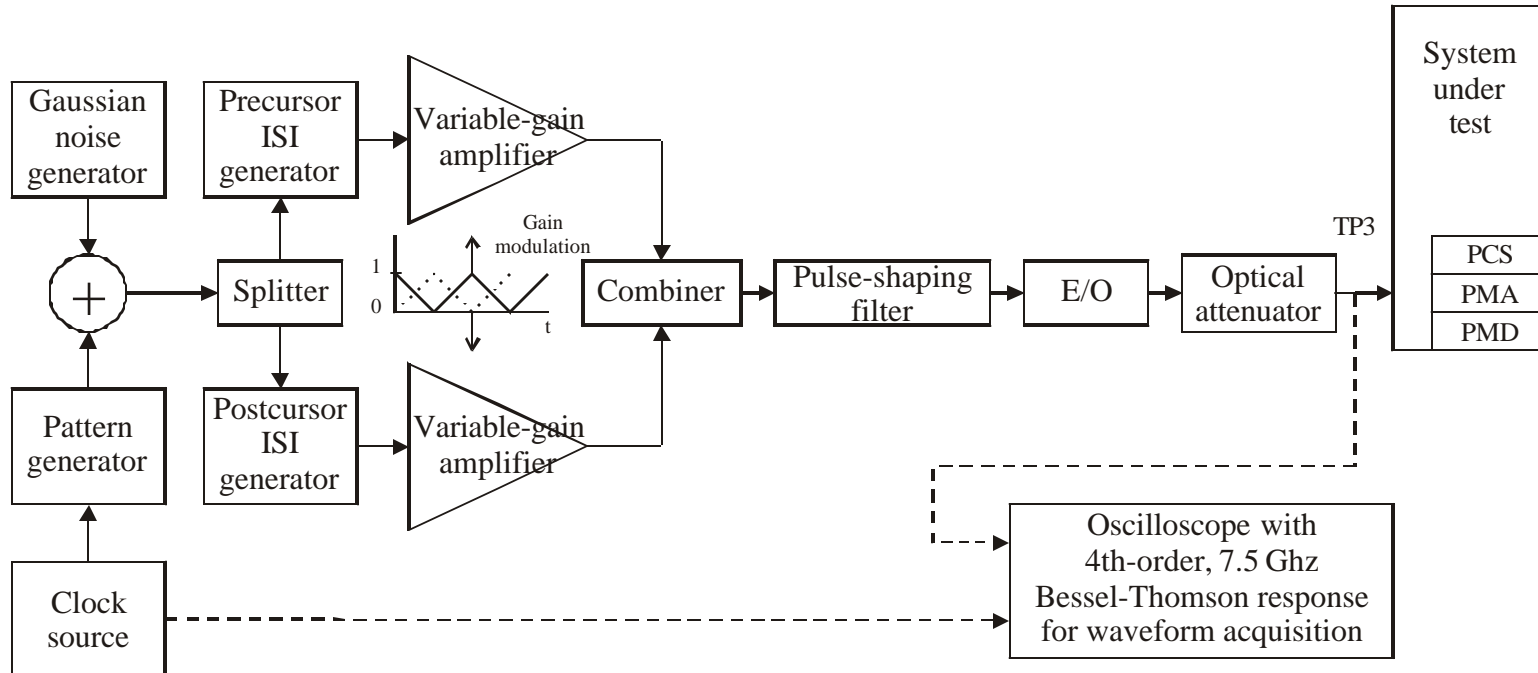
## Resolution of Comment 1: A Few Options

- **Option 1: Add Cautionary Informative Statement**
  - Alerts Users of Standard to Adaptation Time Issue, But Does Not Attempt to Resolve It
  - Suggestion: “While not explicitly specified, equalizer adaptation times need to be less than the time variation of channel characteristics resulting from system mechanical perturbations consistent with those specified in Telcordia GR-63-CORE.” Added to the End of Section 68.6.9
- **Option 2: Add Normative Statement Regarding Adaptation Time Without Specific Test**
  - Suggestion: “Equalizer adaptation times shall be such that a BER of better than  $10^{-12}$  is sustained through mechanical perturbations for operational systems specified in Telcordia GR-63-CORE. Where levels of compliance are allowed, the compliance level must be clearly stated.”
  - May Draw Comments Since Normative Specifications Typically Have Defined Test Methodology
- **Option 3: Add Normative Statement Regarding Adaptation Time, Define Specific Value for Adaptation Time, And Provide Test Methodology**
  - Further Detail Provided on Next Slides

## ■ Basic Concept

- Slow Time Variation Between Pre-Cursor and Post-Cursor ISI Generators is Created Through Modulating the Gain on Amplifiers at the Outputs of the Generators
- A Triangle Wave Is Suggested for Gain Modulation
  - Maintains Normalized Amplitude of Combined Signal at Constant Value
  - Modulation Frequency at Expected Rate of Change Channel Impulse Response – Suggested Value is 50 Hz
- **Current Comprehensive Stressed Receiver Sensitivity and Overload Test May Still be Performed as Separate Test**

## Revised Figure 68-10



Note: "Precursor ISI generator" and "Postcursor ISI generator" could be generalized to "ISI generator 1" and "ISI generator 2"

## Other Changes

- **Add Row to Table 68-4:**

Description	Type	Value	Unit
Adaptation test frequency	min	50	Hz

- **Add to Section 68.6.9.1:** “For the Comprehensive stressed receiver and overload test without equalizer adaptation time testing, one variable-gain amplifier is set at constant gain, while the other is set for high attenuation.”
- **Add Section 68.6.9.5: Equalizer adaptation time test procedure**
- **Add Row to Table 68-5 – Patterns 2 or 3**