

IEEE Antennas and Propagation Society ACTIVITY REPORT

1. **Name of the Department:** Electronics and Communication Engineering
2. **Name of the Activity:** The Language of RF: Transmission Lines and Scattering Parameters

3. **Objectives:**

- To provide an overview of current trends and technological advancements in the RF interconnects industry
- To provide a glimpse of fundamentals of the parameters used in radio frequency circuit design, from an industry perspective

4. **Date, Time and Venue of the Activity:**

6th June 2026, 12.30 to 1.30pm, Seminar hall, Department of ECE

5. **Name and details of collaborating agency (if it is collaborative/joint activity):** IEEE Antennas and Propagation Society

6. **Brief summary of the Programme:**

Presenter of the programmes

- Mr. Akhil Karthik, Signal Integrity engineer, Molex

7. **Outcomes:**

- Explained the context of fundamental parameters in the RF circuit design industry
- Exposure to the application of S-parameters in interconnect design
- Exposure to job opportunities in the high frequency field

8. **Number of participants:**

Particulars	Number of Faculty & Students	Non-Teaching Staff	External Participants
Total Number of Participants 35	IEEE Members : 12 Non-IEEE Members : 23	-	-

9. **Photographs of the activity:**



Bengaluru, Karnataka, India 🇮🇳
 BMS College of Engineering, Bengaluru, Karnataka
 560004, India
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 Saturday, 06/06/2026 01:38 PM GMT +05:30

CHALLENGES IN HIGH-SPEED INTERCONNECT DESIGN

1. GENERAL SIGNALING & ATTENUATION

NRZ (Binary) vs. PAM4 (Multi-level) Signaling

Signal-to-Noise Ratio (SNR) Penalty (4.3 dB for PAM4)

Insertion Loss (dB) vs. Frequency (GHz)

Typical FR-4: High-performance low-loss materials (e.g., BT, RO4000)

High-frequency loss is extreme; performance materials required.

Amplitude vs. Frequency: Lossy Channel

GEOMETRIC LAYOUT CONSTRAINTS (THE PCB BOTTLE-NECK)

VIA STUBS ACTING AS RESONATORS
 Tiny non-backed stub reflects high-frequency energy causing destructive resonance.
 Mandatory Backdrilling / Micro-vias

FIBER-WEAVE EFFECT (INTRA-PAIR SKEW)
 Two differential pairs in glass bundles vs. resin. Woven glass cloth PCB glass bundles vs. resin cause difference in propagation delay. Phase misalignment that destroys the signal eye.

STANDARD CONNECTOR LIMITATIONS
 Near-Chip Cabling vs. Co-packaged Optics

THE INTERCONNECT CHALLENGE

TRADEOFFS TO BALANCE: LOGIC COMPLEXITY vs. HIGH SPEED vs. DSP/FEC COMPLEXITY vs. LOGIC REQUIREMENTS

3. MITIGATION ARCHITECTURES & ACCEPTING CORRUPTION

TX: CTE, Equalization, Feedback, DAC, Hard FEC, Core Engine, Forward Error Correction

RECEIVERS: DSP/FEC, Equalization, Feedback, ADC, Core Engine, Forward Error Correction

Recipients rely on powerful math (DSP/FEC) to cancel interference (ISI).

Recipients can lower target mathematical algorithms to amplify to lower First Bit Error Rate (FBER 10⁻¹²).

A mandatory shift from targeting low-loss Bit Error Rate (BER 10⁻¹²) to accepting those correction First Bit Error Rate (FBER 10⁻⁷) at the end.

From tight First Bit Error Rate (FBER 10⁻¹²) to a looser on FEC for post-processing correction on FEC to protect post-processing correction.


4. SYSTEM DESIGN TRADEOFFS

TRADEOFFS TO BALANCE: LOGIC COMPLEXITY vs. HIGH SPEED vs. DSP/FEC COMPLEXITY vs. LOGIC REQUIREMENTS

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10. **Supporting Documents:**

- a) Attendance sheet
- b) Circulars/Brochures:




Department of ECE
&
BMSCE IEEE APS SBC

PRESENT



Invited Talk on


The Language of RF: Transmission Lines and Scattering Parameters



R Akhil Karthik
Signal Integrity Engineer, Molex

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6.June. 2026
12.30 PM
3rd floor, PJ Block





Total = 35, IEEE = 12, Non-IEEE = 23

BMS College of Engineering, Bengaluru-560019
Department of Electronics and Communication Engineering

Attendance statement
Technical Seminar by Mr. Akhil Karthik, Signal Integrity engineer, Molex, on 6th June 2026

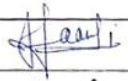
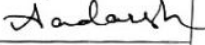
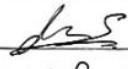
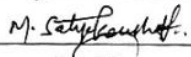


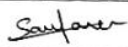
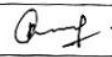
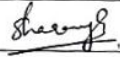


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2	Shantakumar	1BM25LEL04	NO	Shantakumar
3	Sachin V Popale	1BM25LEL03	NO	Sachin
4,	Thanujgowda	1BM25LEL06	NO	Thanuj
5)	Shashank K.S	1BM25LEL05	NO	Shashank
6.	Aashika Banu	1BM25LEL01	NO	Aashika
7.	Lalitha Sachin Naik SP	1BM25LVS08	No	Lalitha
8.	Harindra J	1BM25LVS05	No	Harindra
9.	Gagana AL	1BM24EC064	Yes	Gagana
10.	Lekshitha DL	1BM24EC090	Yes	Lekshitha
11.	Shanya S Karadagi	1BM24EC056	Yes	Shanya



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Department of Electronics and Communication Engineering

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15.	Anagha N	1BM24EC012	Yes	Anagha
16	Siddharth U.N	1BM24EC209	YES	Siddharth
17	Rohan .K	1BM24EC170	YES	Rohan
18	S Dhruv Balaji	1BM24EC173	NO	S Dhruv
19	S Bharathioaj	1BM24EC172	YES	S Bharathioaj
20	NIVEA TONGBRAM	1BM24EC135	Yes	Nivea
21	ANGELARANI SANUJAM	1BF24EC018	Yes	Angelarani
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29	Harsh S	IBM25LDC05	No	
30	Sarjana BA	IBM25LDC03	No	
31	Kanpa R	IBM25LDC01	No	
32	Sharanya R	IBM25LDC04	No	
33	Pooja Khatmal	IBM24EC143	No	
33	Poojika N	IBM24ECT55	No	
33	Niruksha Shetty	IBM24EC132	No	