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Need for Generic 10G+ Channel Model

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Overview

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- Why presently available measured data is problematic for 10G+
- Root cause of the problem
- Proposed solution to allow faster completion of standard

Problem with available measured data

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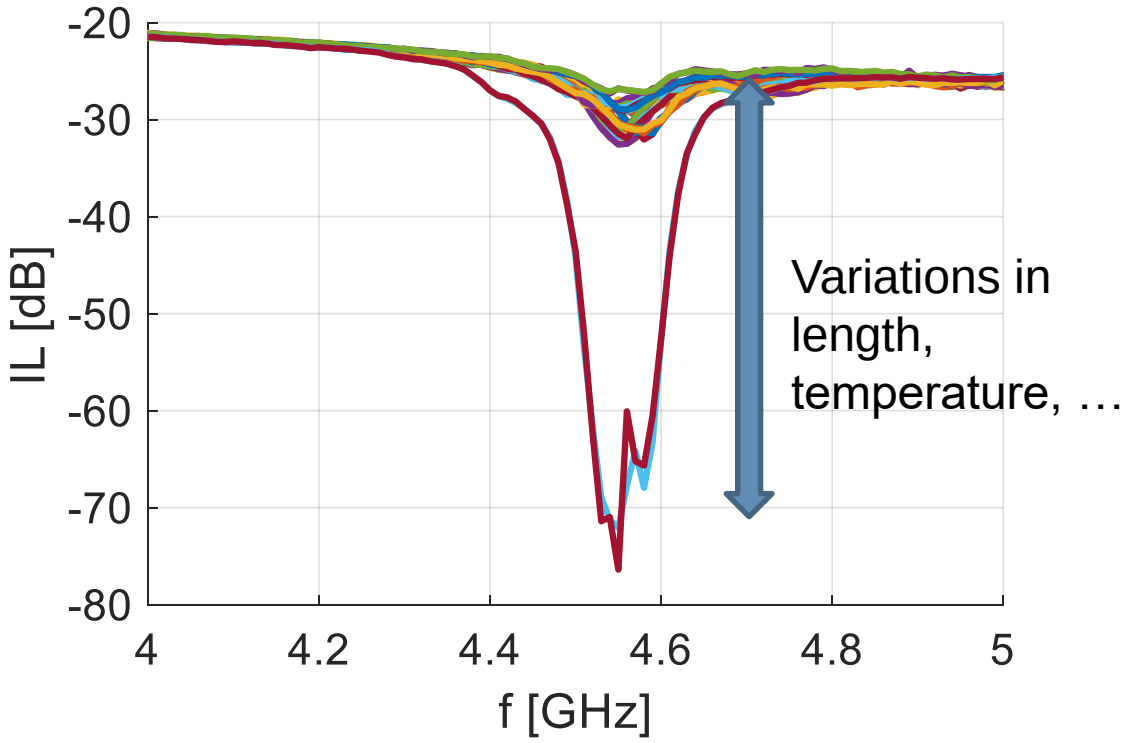
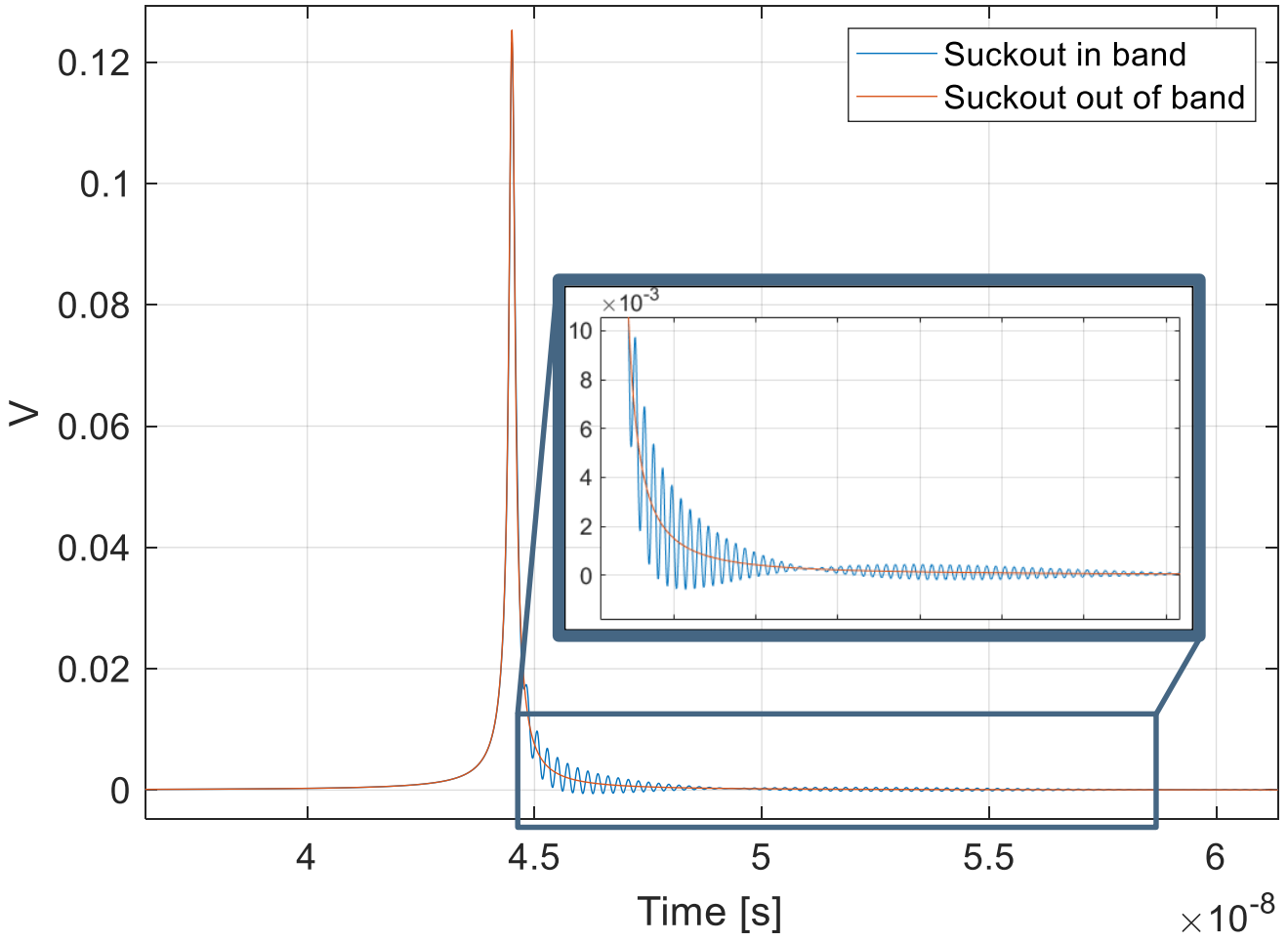
- Automotive differential 1-pair cables are available up to approx. 6 GHz only
- 25 Gbps PAM4 BW = 8.5 GHz → IC needs to compensate for non-existent problem





Root cause of the problem

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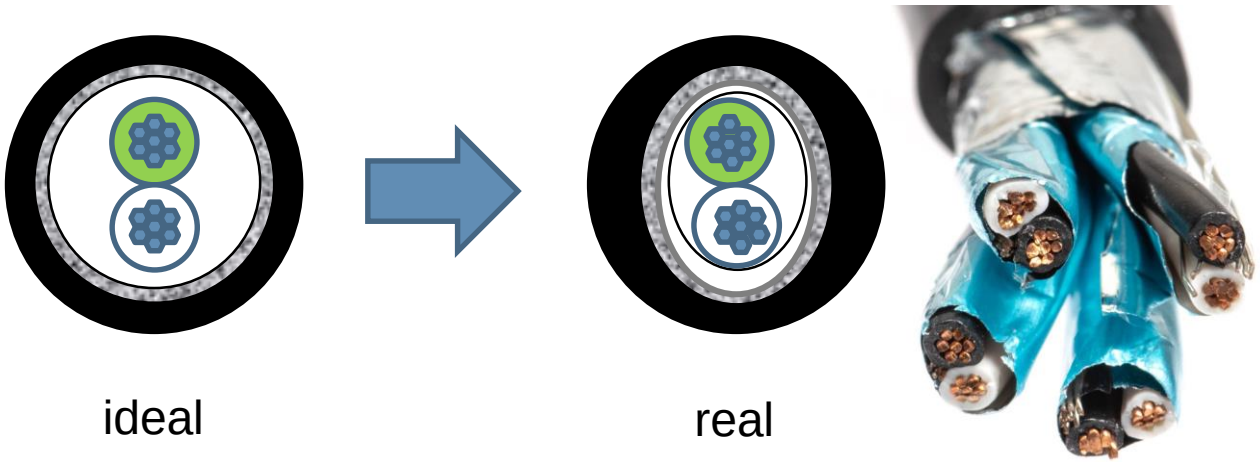
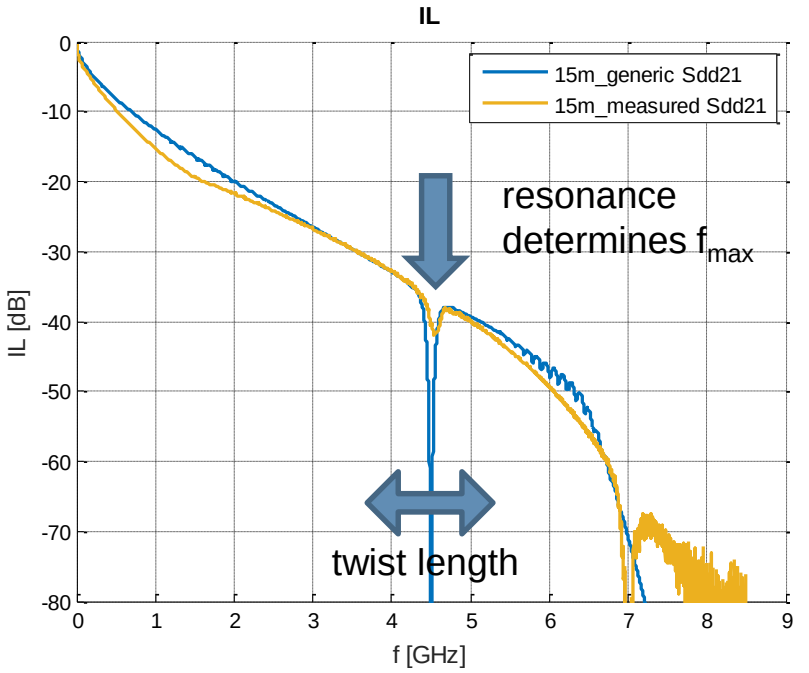
Frequency limitation of currently available STP cable

- STP cables are not perfectly “round”
- Shielding foil tends to creep into the gap between the conductors
- Small periodic impedance change causes a resonance which is related to the twist length and limits the usable RF bandwidth
- To reach 9 GHz bandwidth twist length must be short



ideal

real



Proposed solution to allow faster completion of standard

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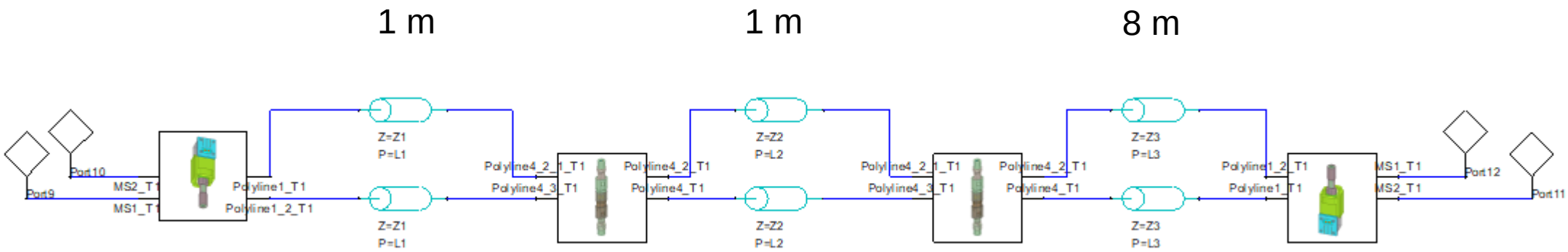
Use S-parameters of connectors + cable model data to represent upcoming cable



(simplified model)

Connectors with >10GHz bandwidth are already available

Cable manufacturers working on automotive grade cables with BW > 9 GHz. Won't be available for several months

How to validate this strategy?

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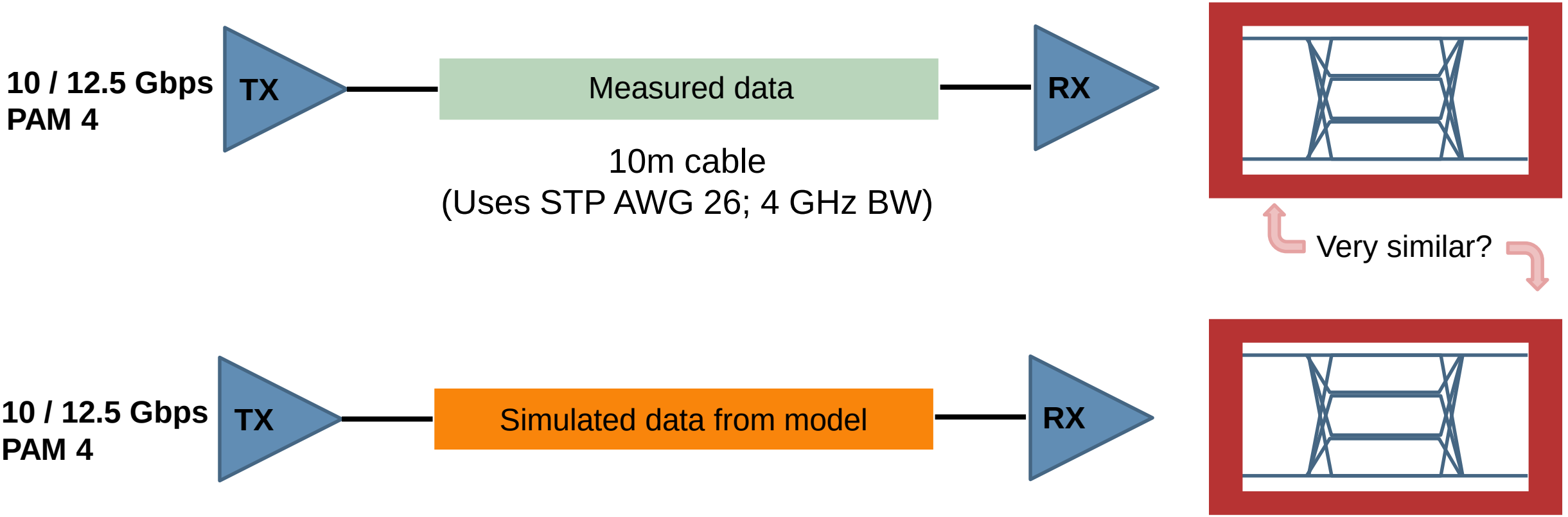

If validated, model can be used to generate topologies with:

- Lengths from 1 m to 15 m
- 0 to 4 inline connectors
- Different cable gauges and types + varying impedances
- New cable vs. aged cable at 105°C

Measured vs. Model data

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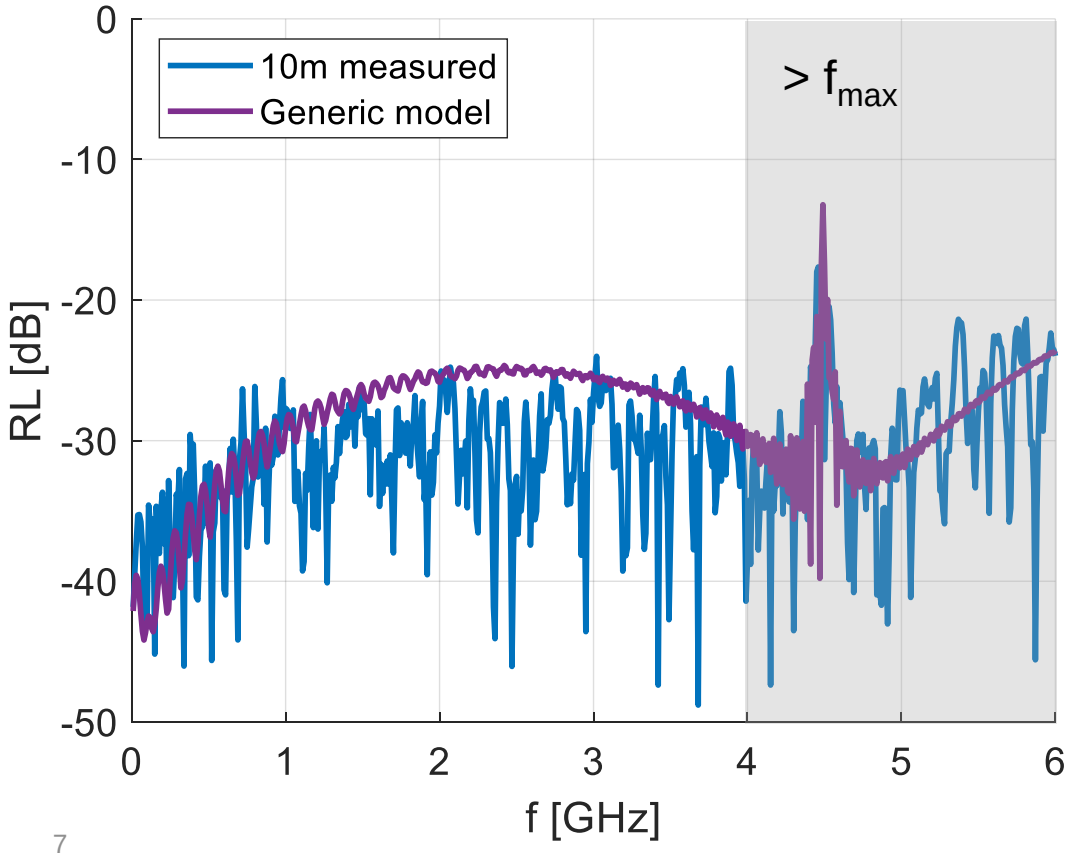
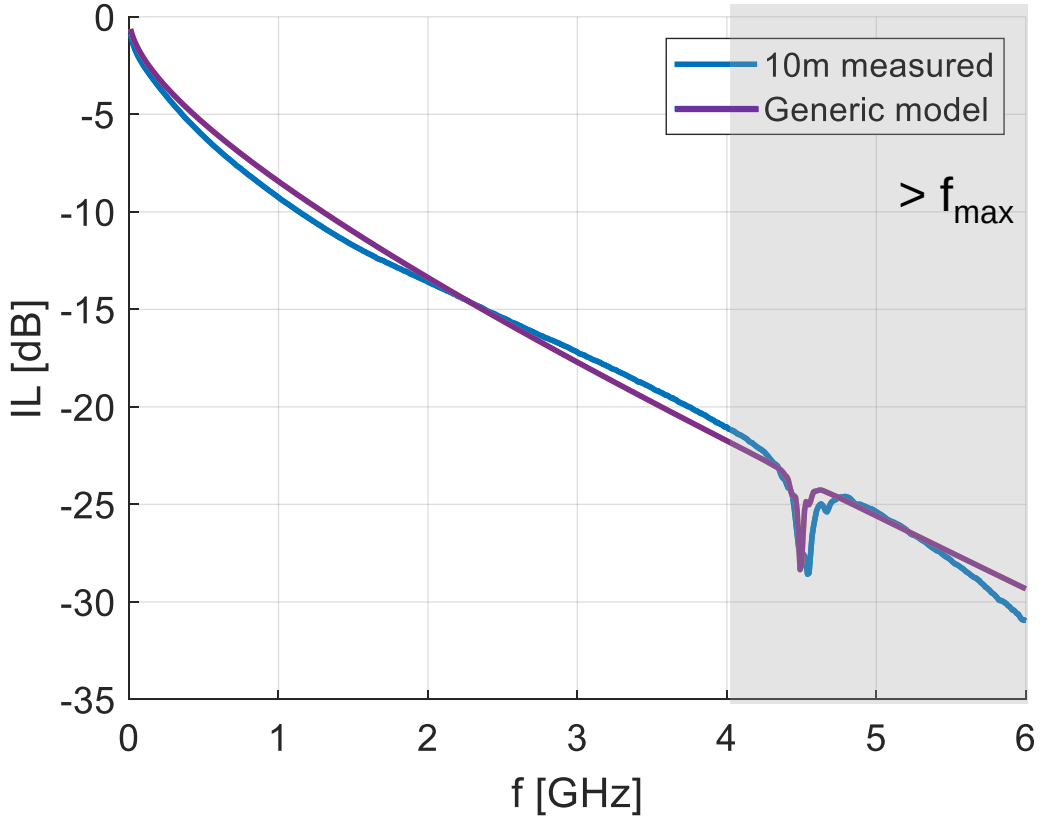
- 10 m, 4 GHz cable

Return Loss



Insertion Loss



Summary and next steps

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- While measured data for 10G+ connectors is available, it will not be available for cables for some months
- A generic model to mimic the cable can speed standard development
- A 10G+ model that will allow rapid generation of different channel variations has been developed
  - Looking to PHY vendors to validate this model