RTPGE Alien XTALK Scenarios

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Objectives

#1. Determine RTPGE Alien XTALK configurations for different uses cases in automotive applications

#2. Reach a consensus for most common configurations

#3. Propose a principle methodology on how to capture the Alien XTALK impact

#4. Use those configurations and methodology to measure the Alien XTALK for #2 and determine the worst-case Alien XTALK for RTPGE Baseline proposals

Content

#1. In-car Situation

#2. Proposed Methodology

#3. Proposed Scenarios

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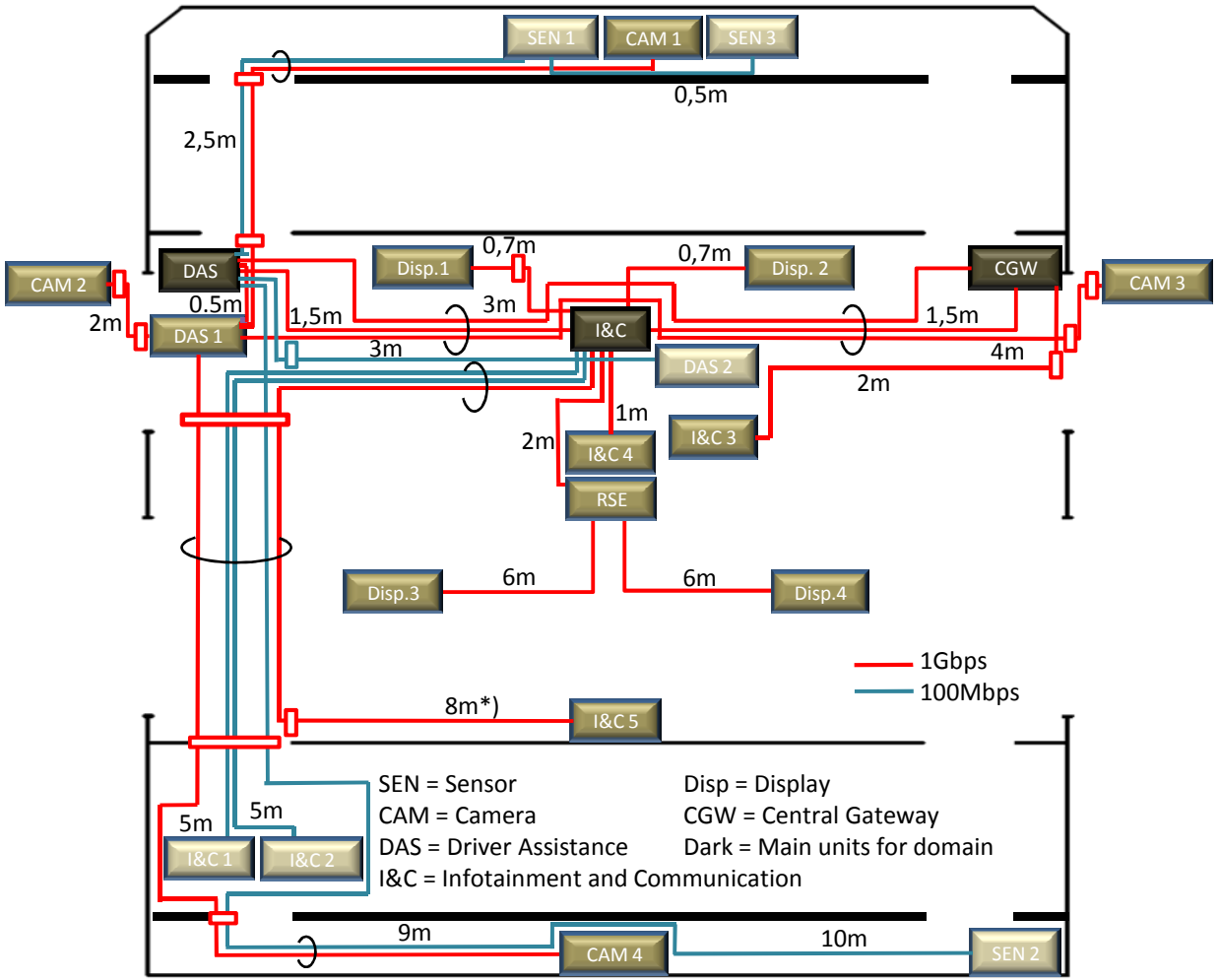
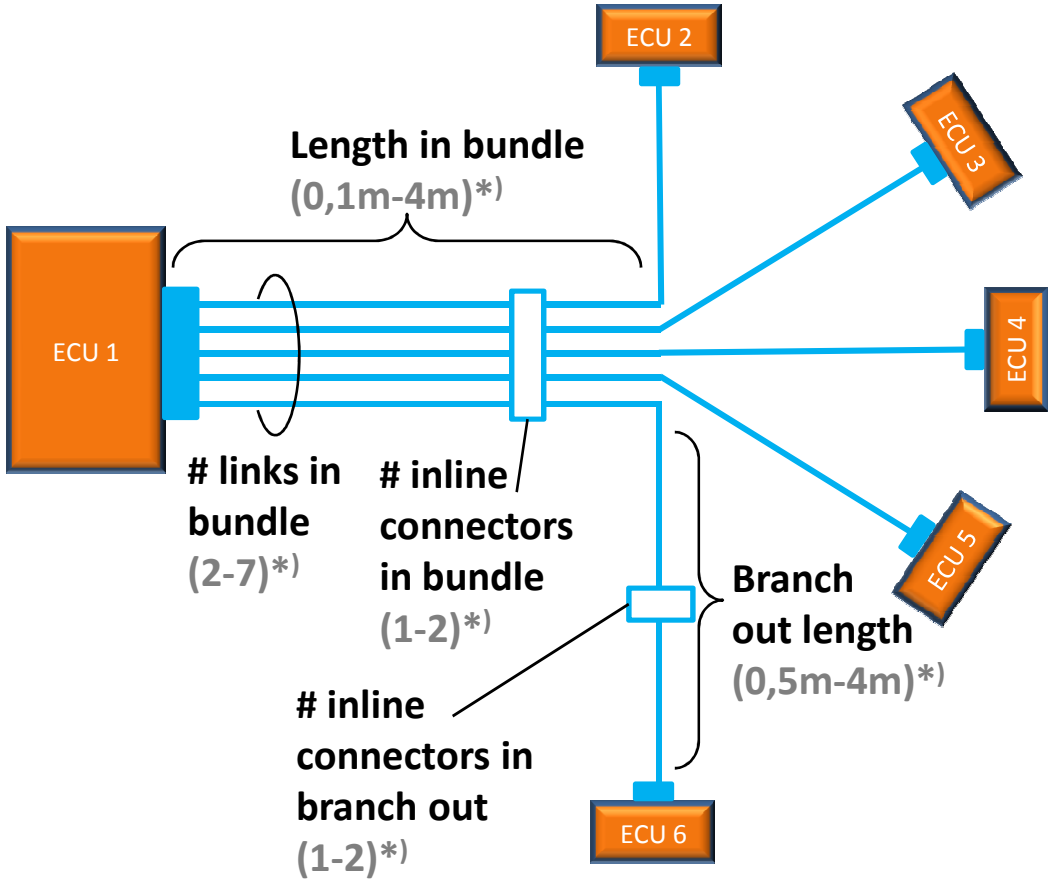
Topology 2



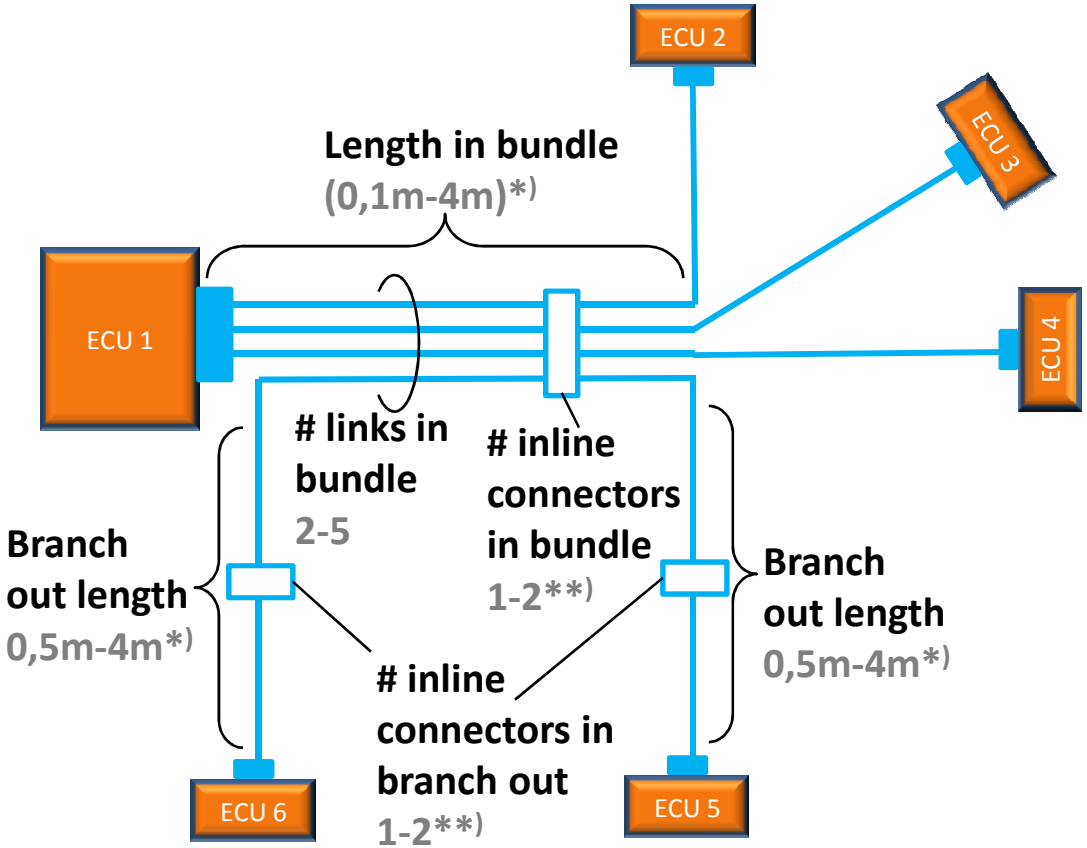
*) Average cable length for 1Gbps (not considering inline connectors) is 3,15m; the average link length for Ethernet is 3,5m

Most Common Scenario
ECU output in Star Topology



*)Typical numbers that do NOT add up to a worst case scenario, see later slides

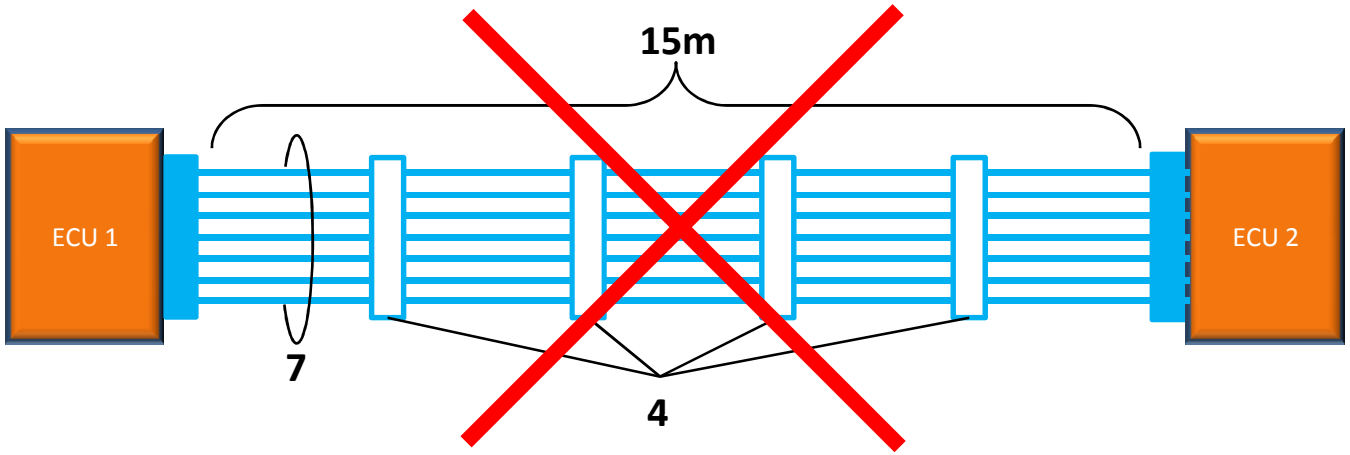
Another possible Scenario
Parallel links



*) Typical values

**) Not more than 4 overall

Non Existent Scenario



- It is extremely unlikely that two RTPGE links run in parallel from source to sink, let alone seven
- There might be four inline connectors in one link (that might be 15m long), but there will never be 4 inline connectors in the bundle
- The above two point are independent from whether the link is 1m or 15m long

Content

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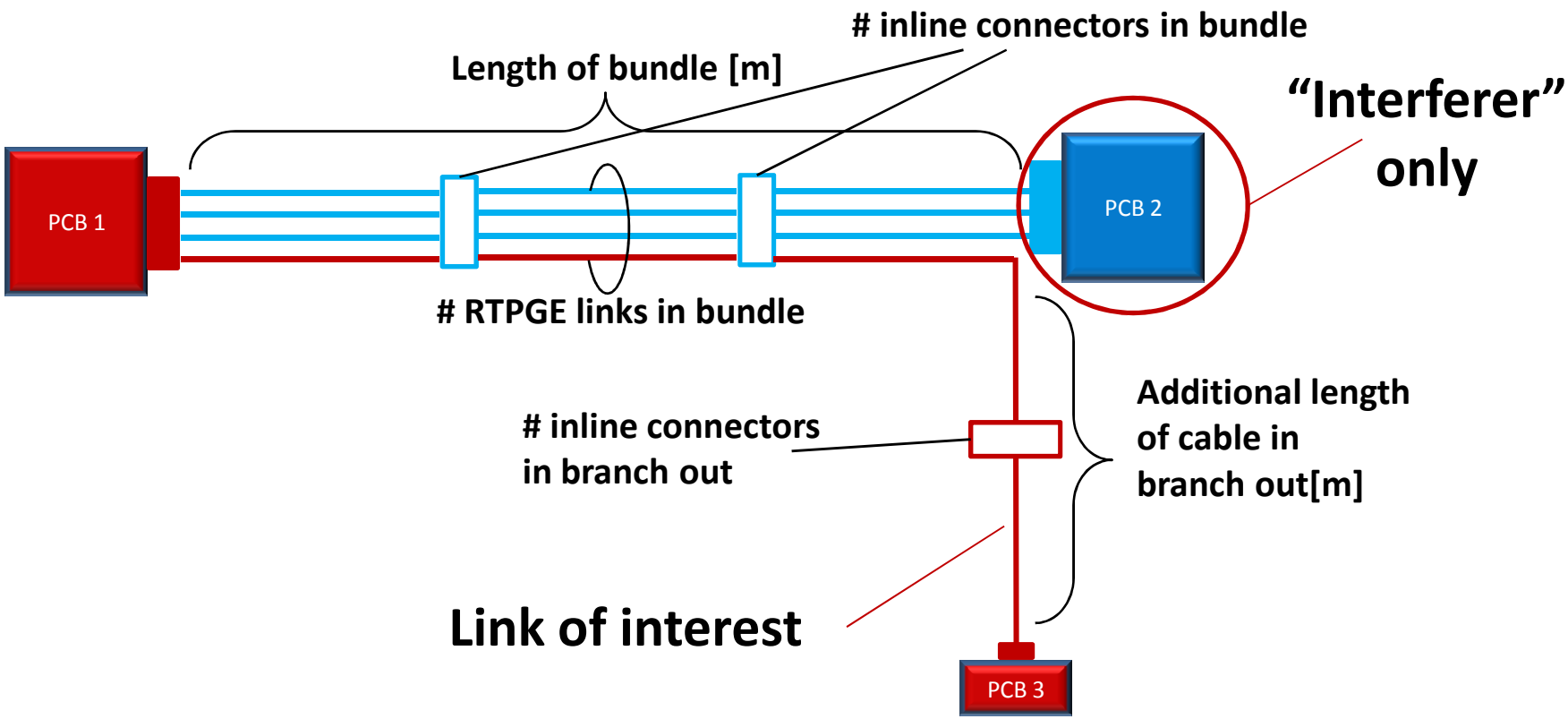
Terminology



Objects of investigation (1)

What has the worst impact?

1. Number of RTPGE links in bundle
2. Length of bundle
3. Number of inline connectors in bundle
4. Branch out (including length and inline connectors)

Hypothesis:

•As the overall length of the cables is short, impact of cable length (e.g. whether it is 2m or 6m) is small

•If inline connector is separate (and not multi-pin MP), the number of inline connectors is not that important

•The branch out ECU is affected less than because it has no alien NEXT

Objects of investigation (2)

What has the worst impact?

1. Number of RTPGE links in bundle
2. (Length of bundle)
3. Number of inline connectors in bundle
4. Branch out (including length and inline connectors)

Possible scenarios to investigate 1 and 3 are e.g.:

- Bundle with two links and 2 MP inline connectors
- Bundle with four links and 1 MP inline connector
- Bundle with six links and no MP inline connector

Comparison for 4. e.g.:

- Bundle with three links with and without branch out

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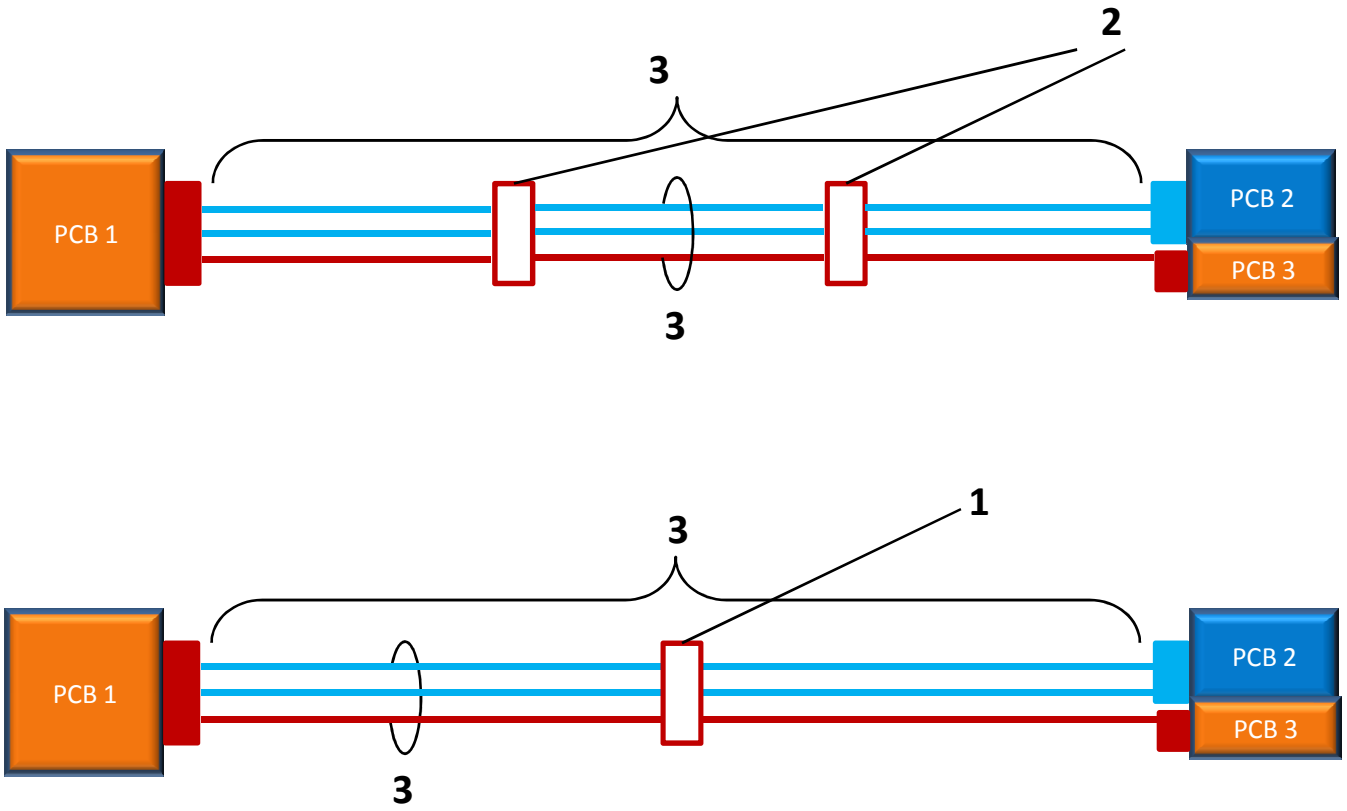
Scenarios

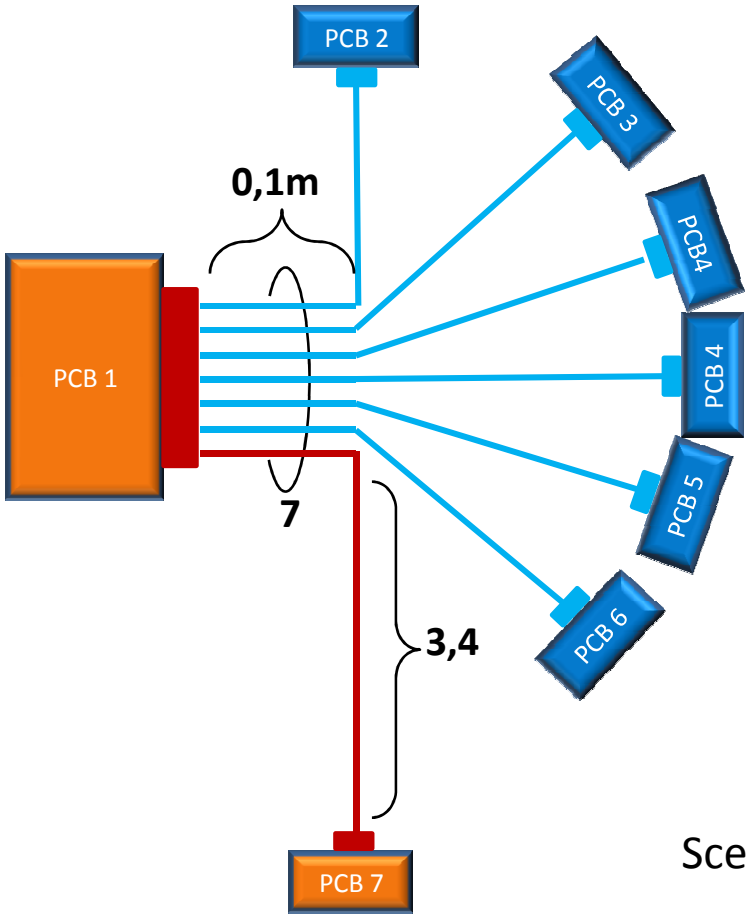
- Common Scenarios
  - Topology 2 scenarios:
    - #1) 3 parallel RTPGE links
    - #2) Central ECU output
  - #3) Surround view system in trunk

- 2. Special Scenarios
  - #4) Video screens in minivan
  - #5) Camera module in extra long vehicle

Topology 2 Scenario:
3 Parallel RTPGE links

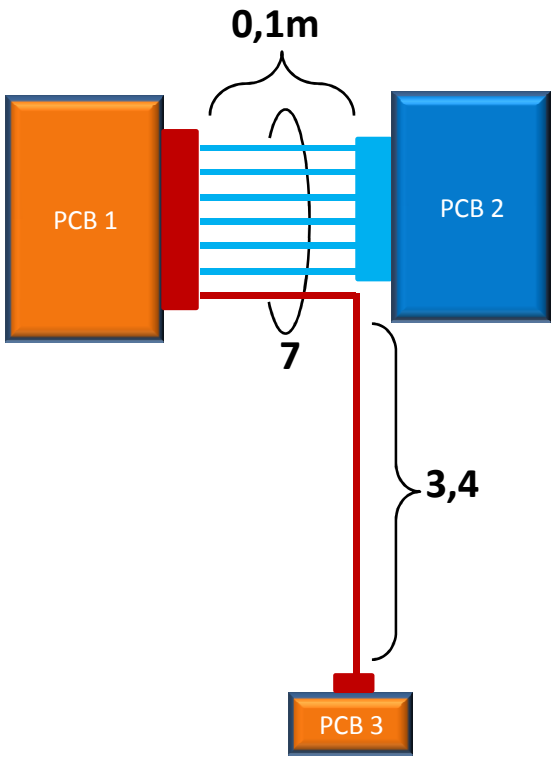


Topology 2 Scenario: Central ECU Output (1)



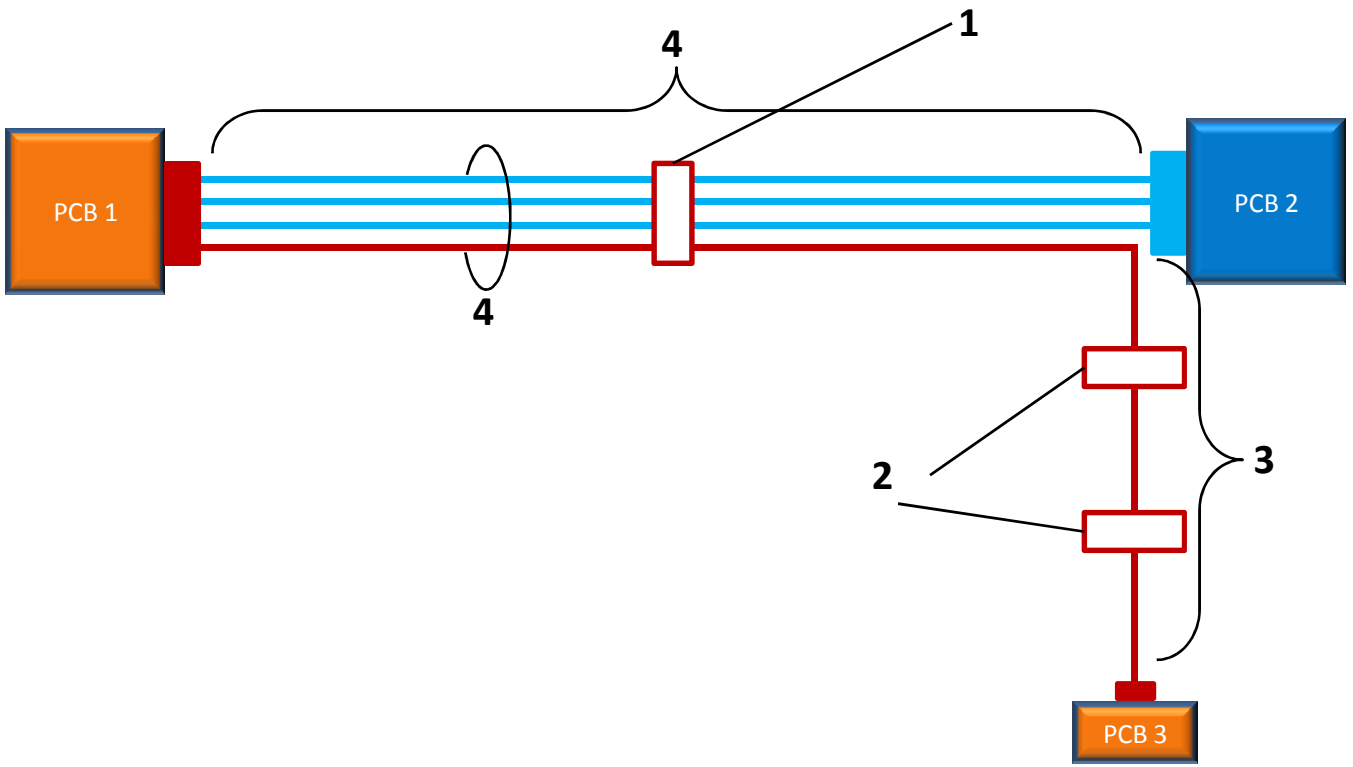
Scenario

Topology 2 Scenario: Central ECU Output (2)



Proposed set up for measurement

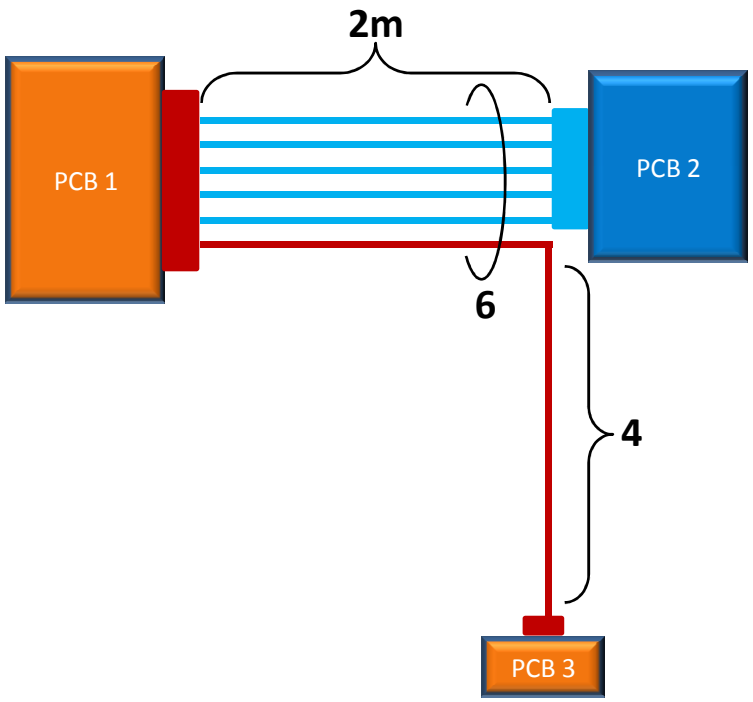
Common Scenario:
Back Camera Module



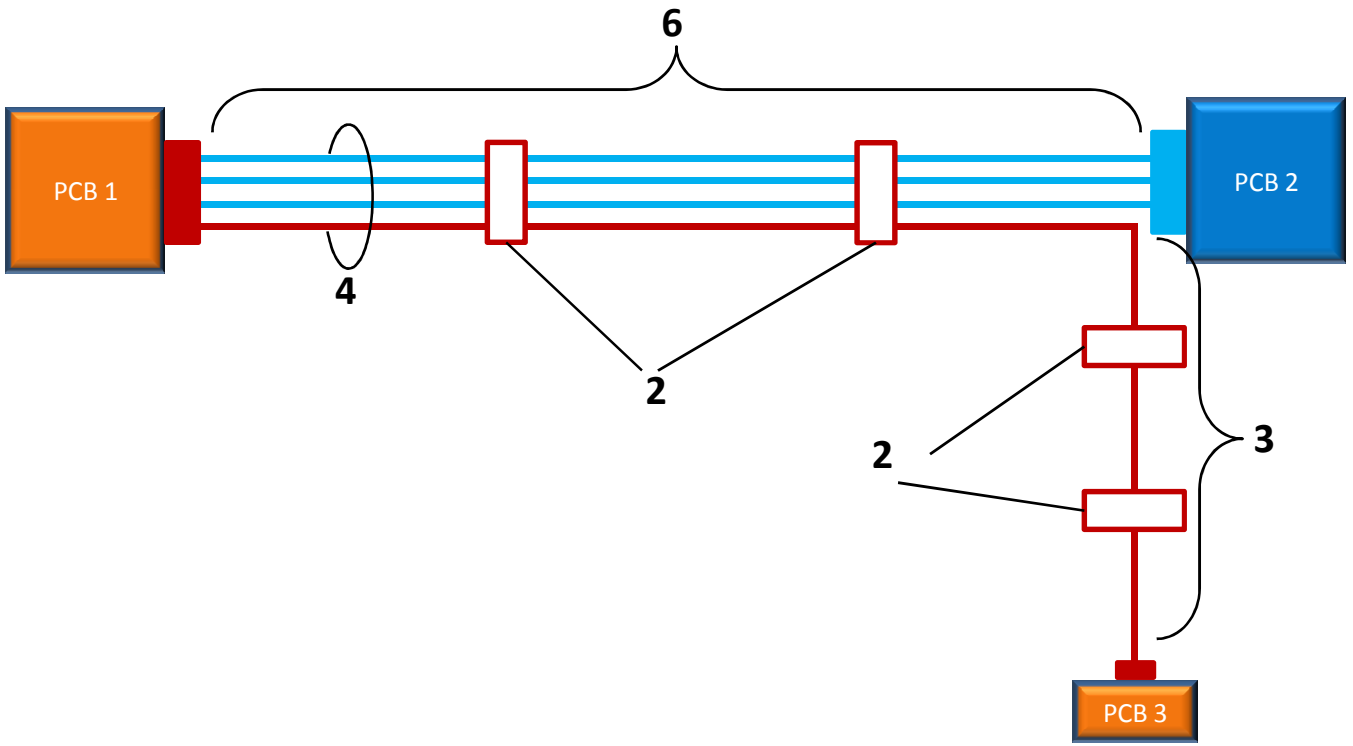
Common Scenarios Overview

Con-figu-ration	# of RTPGE links in bundle	Length of bundle (m)	# of inline connec-tors in bundle	Additional length of branch out [m]	# of inline connectors in branch out	Notes
#1a	3	3	2	0,1	0	Standard in car scenario
#1a	3	3	1	0,1	0	Standard in car scenario
#2	7	0,1	0	3,4	0	6 around one at one end of the cable (e.g. I&C), 3.5m as average length of high speed data cable
#3	4	4	1	3	2	Camera module in back to front camera, one inline connector in branch out

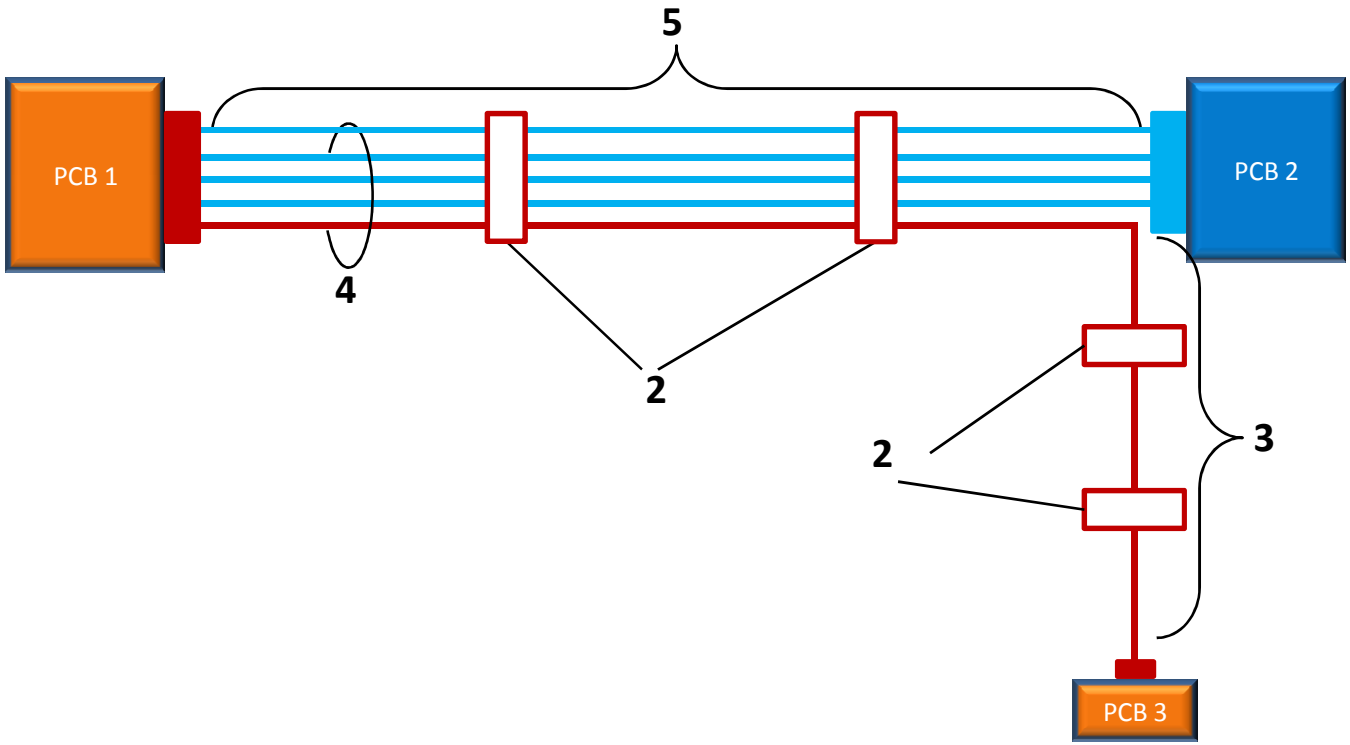
Special Scenario:
Video Screens in Minivan



Special Scenario:
Camera Module in extra long Vehicle



Special Scenario:
Camera Module with more Cameras



Special Scenarios

Con-figu-ration	# of RTPGE links in bundle	Length of bundle (m)	# of inline connec-tors in bundle	Additional length of branch out [m]	# of inline connectors in branch out	Notes
#4	6	2	0	4	0	Video screens in Minivan
#5	4	6	2	3	2	Camera module extra long vehicle
#6	5	5	2	3	2	Camera module with more cameras

Summary

- Slides explained how Alien XTALK occurs in an in-car network
  - The number of inline connectors in a bundle of RTPGE links will not exceed 2
  - A realistic length of a bundle is 4m, though in rarer use cases bundles of up to 6m are possible
  - Links might originate in parallel but they branch out at some point
- A test set up was proposed that takes the branch out into consideration
- A test set up should allow to evaluate the impact of the different elements separately, which are: bundle length, # links in bundle, # inline connectors in bundle, branch out length, # inline connectors in branch out