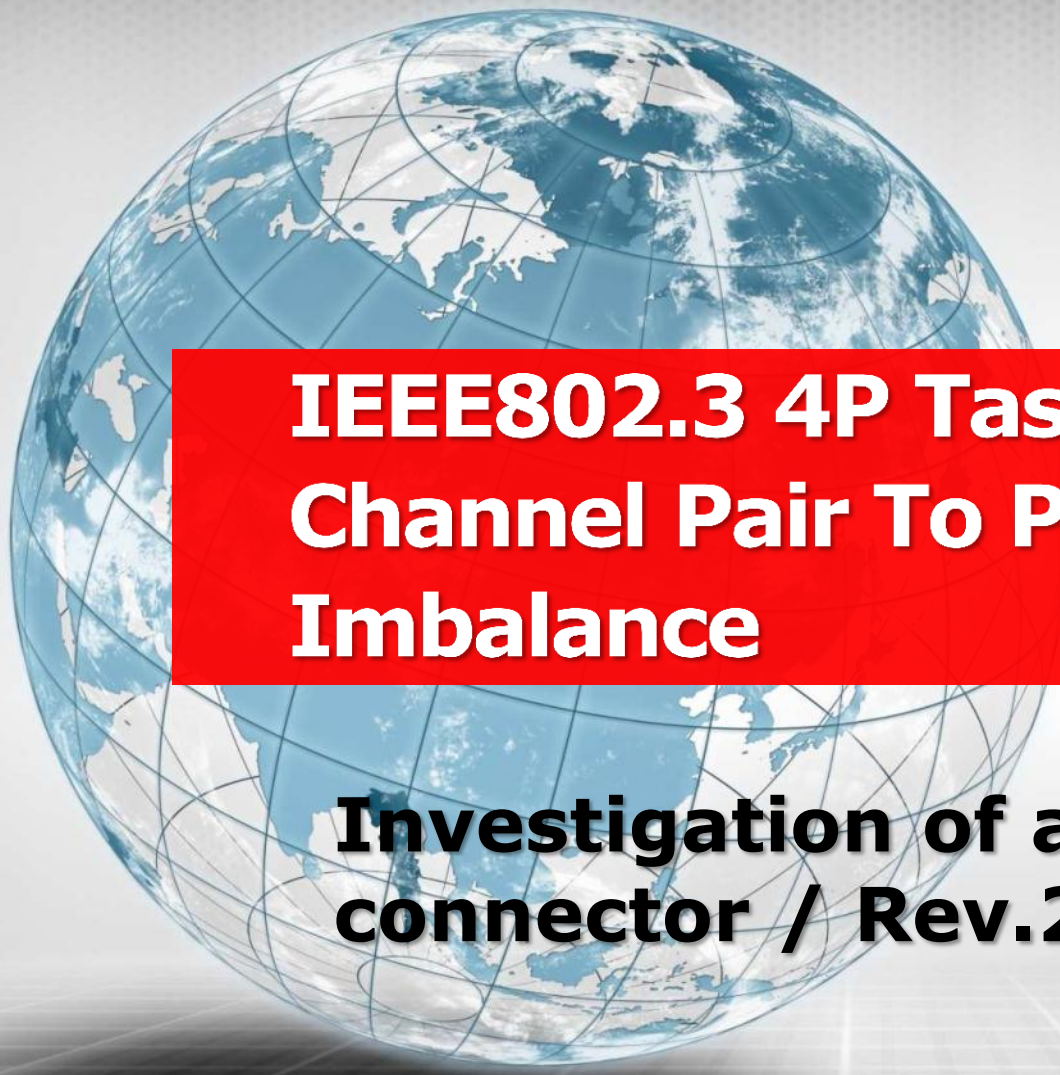

IEEE802.3 4P Task Force Channel Pair To Pair Resistance Imbalance

Investigation of a low resistance connector / Rev.2

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IEC 60603-7 (Ed.3)- Summary of specifications

- **Input to output d.c. resistance (6.4.5):**
  Mated connectors
  200mΩ maximum
- **Initial contact resistance (6.4.4):**
  Contact interface only
  20mΩ maximum
- **Input to output d.c.resistance unbalance (6.4.6):**
  Mated connectors, max. difference between max. and min. (from 6.4.5)
  50mΩ maximum
- **Environmental or mechanical "aging":**
  20mΩ maximum ***Contact resistance change from initial***

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IEC 60603-7

- For the worst case model of the Ad-hoc, (minimum resistance, maximum unbalance) the maximum values according 60603-7 (200*mΩ / 50mΩ) are probably too high/not relevant.*

  But also a low resistance connector is affected by aging (environmental stress, mechanical operation,..) which would increase the initial resistance unbalance over lifetime.

- To increase the database for the Ad-hoc model, this document lists the resistance test data of a specific low resistance RJ-45.

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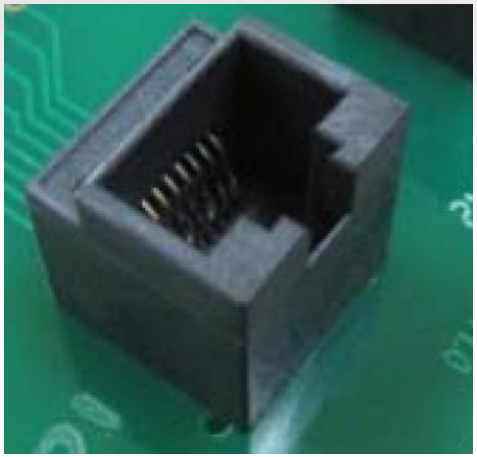
Resistance measurements on samples

- **Product:**
  Short Top Entry
  RJ-45 connector with low input to output resistance.



- **Testing and test references according IEC 60603-7:**
  Jack mounted on PCB, mated connections measured with standard RJ-45 plug (short cable terminations)

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Results (Initial):

- **Input to output d.c. resistance 6.4.5 (initial)**
  Mated connectors, cable termination (plug) to mounting PCB (jack).
  22 samples @8 contacts:
  23.34 mΩ Max
  20.19 mΩ Mean
  17.84 mΩ Min)
- **Resistance unbalance 6.4.6 (inital):**
  Mated connectors, difference between min. and max.
  5.2 mΩ maximum unbalance
- **Initial Contact Resistance 6.4.4**
  (without bulk resistance of connection)
  11.1 / 7.9 / 6.9 (mΩ Max/Mean/Min)

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Results (Aging)

Changes from initial resistance:

- **AP-**Thermal Stress / Cyclic damp heat (8 samples):
  3.1 / 1.3 / -0.9 (mΩ Max/Mean/Min)
- **BP-**Flowing Mix Gas/Corrosion and mechanical operation (8 samples):
  a) 1250cycles (1st half) + FMG corrosion (BP4):
  8.0 / 0.4 / -1.4 (mΩ Max/Mean/Min)
  b) further 1250 cycles mech. operation (BP6)
  4.0 / 1.0 / -0.9 (mΩ Max/Mean/Min)
- **CP-**Vibration (10 samples)
  0.3 / -0.4 / -1.3 (mΩ Max/Mean/Min)
- **DP-**Electrical load and temperature (6 samples)
  3.1 / 0.0 / -3.4 (mΩ Max/Mean/Min)

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Summary of testing

- The influence of aging (corrosion, mechanical operation, load+temp.) to the inital resistance of a connection is higher than the initial resistance unbalance between contacts (*).
- Aging can increase or reduce contact resistance

(*) It has to be considered that the investigated jack has NiPd plating which offers a high contact reliability.
A similar jack with a low quality plating could show a higher change of the contact resistance after aging.

This result is for a specific jack. A more complex jack (fully $Cat6_A$) could have a higher initial resistance unbalance but probably also a higher resistance in general.

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Summary of testing

- **d.c. Resistance of connection (plug and jack) 22 samples:**
  - Minimum 17.84 mΩ initial only
  - Minimum 17:53 mΩ with aging
  - Maximum 23.34 mΩ inital only
  - Maximum 29.47 mΩ with aging
- **Resistance unbalance (from above)**
  - Maximum 5.2 mΩ initial only
  - Maximum 11.94 mΩ with aging

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