



EC Cabling News

News on International Standardisation

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Next generation cabling – 40 Gbit/s Ethernet on balanced twisted pair copper cabling

The development of standards to support data transmission of 40 Gbit/s on twisted pair cabling remains to be one of the hottest topics in the copper cabling standardisation activities. This is reflected in below description of the on-going work in the different standardisation committees.

With the development of new component and cabling standards for higher frequencies, e.g. the new Category 8.1 and 8.2, new test methods will also be required, and DELTA participates actively in the development of these new test standards. We are continuously working on improving and enhancing our test equipment to match the requirements of the standards in development as they progress and mature. DELTA has for instance equipment to support the mixed mode (or balun less) test method for high frequency transmission test of balanced components.

IEEE – development of 40GBASE-T standard

The work on “next generation” Ethernet on twisted pairs has progressed from the study group phase into a formal standardisation project by the formation of the IEEE P802.3bq 40GBASE-T task force in May 2013. The objective of the proposed 40GBASE-T is to support a 40G data rate using a 4-pair, balanced twisted pair copper cabling channel with a length of up to 30 m, and having up to 2 connections. The proposed channel configuration will thus be restricted in both length and number of connections compared to the well-known reference implementations for current classes D to F_A, and will primarily be intended for EoR (End-of-Row) and ToR (Top-of-Rack) connections in data centres. Channel requirements are currently under discussion in the task force, and it is expected to have a first draft set of requirements ready in 3-6 months from now, i.e. a first indication of what channel performance will be required to support 40GBASE-T, will not be available until then. The overall 40GBASE-T standard will – according to the current project time line – be finalised and published in September 2015 at the earliest.

Other on-going activities in IEEE 802.3 include the development of a standard for Reduced Twisted Pair Gigabit Ethernet - RTPGE (IEEE 802.3bp – 1 G Ethernet on a single pair, targeted for use in automotive industry), and a study group investigating the feasibility for a new 4-pair Power over Ethernet with higher power level than PoE+.

Standardisation of cabling in ISO/IEC JTC 1/SC 25/WG 3

Working group 3 of JTC 1/ SC 25 is responsible for cabling standards, with ISO/IEC 11801 - Generic cabling for customer premises - being one of the most important. The scope of WG 3 also includes test procedures and planning and installation guides.

The 55th meeting of ISO/IEC JTC 1/SC 25/WG 3 was held on 30 September – 03 October 2013 in Kista (Stockholm), Sweden. The meeting was attended by more than 60 experts and DELTA was represented by Lars Lindskov Pedersen.

Below, a summary is given for selected projects in the work programme of WG 3.

Balanced cabling for 40 Gbit/s data transmission

A 2nd PDTR (proposed draft) for the technical report ISO/IEC TR 11801-99-1 "Information technology - Guidance for balanced cabling in support of at least 40 Gbit/s data transmission" was circulated for voting and commenting in April 2013. It received substantial support, but also many technical comments. The comments were resolved at the WG 3-meeting, resulting in significant technical changes and some restructuring of the document. One of the major challenges was how to progress the technical report to the next stage (DTR) considering that the PDTR had essential references to IEEE 40GBASE-T. As the channel requirements are not yet available from IEEE, see above, it was decided to remove references to the (future) IEEE 40GBASE-T standard. The resolutions will be implemented in a new draft, which is to be circulated as DTR in December.

The report introduces the new channels Class I and Class II, which are characterised up to 1600 MHz (with 2000 MHz ffs.), and based on Cat. 6_A and Cat. 7_A components with enhanced performance and extended frequency, also referred to as Category 8.1 and Category 8.2 components, respectively. The TR only addresses the channel characteristic, and contains no component requirements or characteristics.

In addition to Class I and Class II channels, the TR contains descriptions and characteristics for channels based on existing Cat. 6_A and Cat. 7_A components, as well as channels based on Cat. 6_A and Cat. 7_A components with extended frequency (1600 MHz, with 2000 MHz ffs). The channel configurations are all based on a maximum length of 30 m and maximum 2 connections, i.e. aligned with the IEEE proposal.

The main purpose of the TR is to describe what channel performance can be reached with current products (i.e. based on existing Cat. 6_A and Cat. 7_A components) with the given restrictions on the channel configuration, or what channel performance is considered achievable with channels based on components with enhanced performance and/or extended frequency. The channel characteristics are used to derive Shannon capacity for the various channel configurations, i.e. what is the expected data rate that can be supported. It must, however, be emphasized that since the channel requirements are not yet available from IEEE, the channels can NOT be assessed for support of 40GBASE-T.

Generic cabling standards (ISO/IEC 11801 and related)

As previously reported, the cabling standards for customer premises, industrial premises, homes, and data centres are currently being prepared for work on a new edition. This 3rd edition will include a restructuring of the ISO/IEC generic cabling standards as well as a number of technical updates. The restructuring is basically a re-shuffling of the generic cabling standards for the different premises into a series of standards ISO/IEC 11801-x with a structure similar to what is known from the European cabling standards EN 50173-x. The technical changes to be implemented for the 3rd edition will include the addition of the new classes in support of 40Gbit/s data transmission and a revised annex on modelling, which is the outcome of the work in JMTG – joint modelling task group. The current status is that the editorial re-shuffling of the ISO/IEC 11801 has been finalised, and a set of working group documents is now ready to be used as basis for the new edition. A new work item proposal (NWIP) will be submitted soonest possible to formally start the work on the technical revision.

At the meeting in Kista, it was further decided that the results from the work in JMTG should be published as a separate technical report on modelling and a NWIP is expected shortly.

For the data centre cabling standard ISO/IEC 24764, amendment 1 has been circulated as a final draft in September 2013. The amendment introduces the intermediate distributor used in data centre cabling, as well as channel configurations consisting of two or more link segments.

The MICE tables in ISO/IEC TR 29106 have been updated with the publication of amendment 1 in December 2012, and are now aligned with the MICE tables included in the industrial cabling standard ISO/IEC 24702. Related also to the industrial cabling, the end-to-end link (E2E) has been addressed as a new structured cabling configuration on request from the industrial networks committee IEC SC 65C. The E2E is in principle similar to



a channel, except that it typically has field terminated plugs at the ends and may have no internal connections and thus no test interfaces. SC 65C has asked WG 3 to work out guidelines and recommended limits for testing of this type of cabling, taking into account the contribution from the field terminated plug. This subject has primarily been addressed by the modelling group JMTG, and a draft scope for a proposed new technical report has now been agreed. At the Kista meeting it was agreed to submit a NWIP for the TR.

Automated infrastructure management – AIM

An automated infrastructure management system is characterised as integrated hardware and software that automatically detects the insertion or removal of cords, documents the cabling infrastructure including connected equipment, enabling management of the infrastructure and data exchange with other systems.

The PDAM (proposed draft) for amendment 1 to ISO/IEC 14763-2 “Implementation and operation of customer premises cabling - Part 2: Planning and installation” (amendment for inclusion of AIM systems), received substantial support and will be circulated as FDAM (final draft amendment) when the draft has been amended according to the resolution of comments.

New work has started on the development of ISO/IEC 18598 “Information technology - Automated infrastructure management (AIM) systems - Requirements, data exchange and applications” (proposed new title), currently only at working draft level. This scope of the standard includes explaining AIM systems and their benefits in general, as well as proposing a common data model for data exchange, in other words “standardising” the data formats, allowing applications to be developed by other parties. It is expected that a first CD will be circulated Q3-2014.

Telecommunications bonding

A first CD for ISO/IEC 30129 “Telecommunications bonding networks for buildings and other structures” (new title) was circulated for comments in March 2013 and resulted in almost 300 comments. The comments were processed and resolution of comments agreed at the Kista meeting. The ISO/IEC 30129 can be considered as an attempt to agree on a new *international* standard on telecommunications bonding, trying to embrace and combine the best of the existing European and American standards.

The next meeting in ISO/IEC JTC 1/SC 25/WG 3 will take place in February-March 2014.

Standardisation of cables and related test methods in IEC TC 46

TC 46 and its subcommittees develop and maintain standards for e.g. coaxial and balanced cables, cable assemblies (e.g. cords), and coaxial connectors, as well as related test methods such as screening effectiveness test methods (transfer impedance, coupling attenuation etc.). The latest meeting of IEC TC 46 and all SC's and WG's was held in Milan, Italy, 23 to 27 September 2013 with participation by Lars Lindskov Pedersen from DELTA.

The proposed new work on standards for cables characterised up to 2 GHz has been formally approved and will be carried out in working group 7 of SC 46C. WG 7 and SC 46C are responsible for standardisation of symmetrical pair/quad cables for digital communication such as the IEC 61156-series. The scope also includes standards on related test methods. The numbers for the new standards will be IEC 61156-9 for the horizontal cable and IEC 61156-10 for the work area cable. The standards contain specifications for Category 8.1 and Category 8.2 cables, and list characteristics and minimum transmission requirements up to 1600 MHz with 2000 MHz ffs. In addition to the requirements given in IEC 61156-9 (IEC 61156-10), a Category 8.1 cable shall meet all requirements for a Category 6_A cable as given in IEC 61156-5 (IEC 61156-6). Similarly, the Category 8.2 cable shall also meet all Category 7_A requirements, which will ensure backwards compatibility. Taken into consideration that the maximum length of the channels making use of these cables has been reduced to 30 m, cf. notes on ISO/IEC TR 11801-99-1 above, it was agreed to change the reference length for transmission performance tests to 30 m. Where applicable, the limits are amended accordingly. Further, there has been some



discussion on how to specify screening requirements for frequencies higher than 1 GHz, e.g. whether screening attenuation should be re-introduced in the cable specifications. In the current standards, transfer impedance is used for lower frequencies, and coupling attenuation for frequencies from 30 MHz to 1 GHz. The general preference seems to be to extend the coupling attenuation test up to the required maximum frequency, instead of complementing with screening attenuation tests. When measuring coupling attenuation up to e.g. 2 GHz it will probably be necessary to do a first measurement up to 1 GHz using the well-known absorbing clamp method, and then a second 1 GHz to 2 GHz using either another absorbing clamp, or use a triaxial test method. The test methods for screening effectiveness are developed in working group 5 of TC 46.

Standardisation of cables and related test methods in CENELEC TC 46X

The work in CENELEC TC 46X is more or less parallel to the work in IEC TC 46.

TC 46X/SC 46XC is responsible for e.g. the European cable standards in the EN 50288-x-y series. New editions of EN 50288-1 to EN 50288-6-y, i.e. cables characterised up to 100 MHz (Cat. 5), 250 MHz (Cat. 6) and 600 MHz (Cat. 7), respectively, were published in May 2013. The standards for horizontal cables characterised up to 500 MHz (Cat. 6_A - EN 50288-10-1 and -11-1) and up to 1000 MHz (Cat. 7_A - EN 50288-9-1) were published in December 2012. New work for cable up to 2000 MHz is under investigation.

Working group 2 of TC 46X is responsible for electrical test methods (excepting EMC) and was revived during 2013 after having been inactive for a longer period. A first meeting was held in Frankfurt in July with participation by Lars Lindskov Pedersen from DELTA. WG 2 will be in charge of carrying out maintenance work on the EN 50289-1-xy series of test standards. The maintenance will include upgrading of the existing test methods and extending the applicable frequency range to cover the test needs for the upcoming standards on e.g. cable for 2000 MHz. Mixed mode or balun less test methods for symmetrical cable and cabling components will be introduced where applicable.

Standardisation of connectors and related test methods in IEC TC 48/SC 48B

Working group 3 of IEC TC 48/SC 48B is responsible for standards for electrical connectors such as the "RJ45"-type standardised with the IEC 60603-7-series. Working group 5 is responsible for standards for related test methods such as the IEC 60512-series. The latest meetings in WG 3 and WG 5 were held in Delft, Netherlands, in September 2013. Unfortunately, these meeting coincided with the IEC TC 46 meetings in Milan, thus preventing participation by DELTA this time.

Also in SC 48B, significant development work related to the expected 40GBASE-T is on-going. This work includes the approved new work on IEC 60603-7-81 and IEC 60603-7-82, which will be the new connector standards for Category 8.1 and Category 8.2 connectors, respectively. IEC 60603-7-81 is based on the standard RJ45-type connector, characterised up to 2000 MHz and being backwards compatible to the IEC 60603-7-51 connector (Cat. 6_A), whereas IEC 60603-7-82, likewise characterised up to 2000 MHz, will be based on and backwards compatible with the IEC 60603-7-71 (Cat. 7_A) connector.

In addition to the two new standards, IEC 61076-3-104 (the "TERA"-type connector) and IEC 61076-3-110 (the "GG45"-type connector) are currently under revision. The new editions will include characterisation up to (minimum) 2 GHz and making the connectors suitable for use as Category 8.2 connectors in cabling in support of 40 Gbit/s data transmission.

DELTA will continue to participate actively in the standardisation of the cabling and cabling components for the future 40GBASE-T and keep our customers updated through regular newsletters.

