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The Gigabit@Coax (G@Co) Solution

Symmetric 10GBPS Overlay over existing Coax Infrastructure

The increasing market demand for more bandwidth is pushing new technologies. DELTA Electronics is introducing a new solution that can be used on existing cable infrastructures and in parallel with DOCSIS broadband services. Author: Stephan Hilbert, DELTA Electronics

Classically a fibre connection is used to realize 10Gbps IP services. However, high construction cost, long rollout time and complex project management are the main obstacles, especially in urban environment.
Like a Gecko, the G@Co solution goes unusual paths by using the existing coaxial cable in a piggyback way.

The challenges in today's network infrastructure are:

- Access to a high speed IP backbone network is not widely available
- To roll out fibre to every place in the field is expensive and takes years
- Often a coaxial CATV network is available in the field, however does not reach the required performance

Main Applications of G@Co:

- Remote PHY: Will be installed in many locations within the CATV network, but needs a 10Gbps IP fibre connection
- Corporate customers: are asking for symmetrical Gbit IP network connections and low latency for virtual reality applications
- 5G: Due to their smaller coverage area, the amount of 5G mobile base stations will increase. 5G base stations expect a 10 Gbps fibre connection with ultra-low latency and jitter.
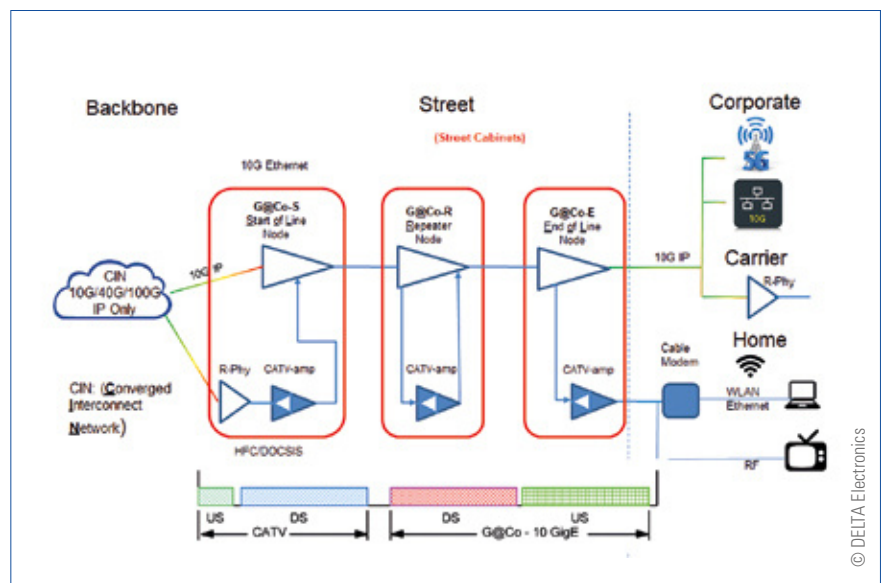
Key Benefits of G@Co:

- Time: Very fast IP-service implementation for the customer as no time consuming planning, approvals and construction is needed

- Cost: As no civil works, extended project management and planning is needed, it saves up to 80% of the costs
- Flexibility: The G@Co-solution offers an easy, quick and cost effective way to extend the IP portfolio to serve the above mentioned applications. It therefore builds the ideal bridging technology for cable operators using the available infrastructure assets in parallel with their DOCSIS offering.

Typical setup:

- A typical setup consists of a Start of Line Node, where the 10G IP fibre connection is inserted into the coax,
- a repeater node where the signal is 100% refreshed if the cable distance is to long,

- a End of Line Node, where the 10G IP fibre connection exits the coax again.

Long cable distances are possible due to 100% digital signal refreshment in the repeater, allowing multiple repeater nodes in a row without limiting the transmission speed. In case the total link attenuation does not exceed 55dB, it is possible to pass an amplifier with a passive G@Co module thus saving cost and power. The G@Co power supplies have an active power factor correction to avoid apparent power which helps to keep the remote powering infrastructure as it is. The power passing capability of the G@Co nodes with 10 A is possible at all rf-ports. The used CATV network frequency (862MHz, 1004 MHz, 1240 MHz), can be adapted in seconds with pluggable diplex filters into the G@Co Nodes,

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Overview G@Co-Solution

making a later CATV network upgrade easy and cost effective.

IP features:

As G@Co is acts as a virtual IP fibre connection, it also fulfils the typical timing requirements such as:

- Synchronous Ethernet (SyncE) and IEEE-1588v2 (click and time synchronization) which is, beside QoS and high data rates, mandatory for backhauling of mobile radio cells
- Clock transfer incoming/outgoing from any 10G interface
- PTP (Precision Time Protocol) IEEE-1588v2 (2008) in transparent mode
- Rx / Tx Flow-Control (802.3) over multiple G@Co links

Provisioning and Monitoring:

- Being part of the IP Network, customers expect also the typical Network Management features such as:
- Management functions as known from the Metro Ethernet Forum
- Management: SNMP v2, v3 (secure), CLI (Command line interface), GUI (Graphic user interface)
- https:// (SSL) web access

Product versions and availability:

The G@Co products offer a solution in a compact node form factor to be mounted into street cabinets or for strand mount applications, and have the same housings as Delta's network amplifiers or Remote-Phy devices.

The product is available and ready for shipment typically within 6-8 weeks after receipt of order.

The G@Co-product line is a result of a close partnership with the GiaX GmbH in Erlangen, Germany. ■

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Stefan Hilbert, Product manager in the area of hybrid fiber coax

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Start-of-line Node

Repeater Node

End-of-line Node

Passive loop through Node

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