



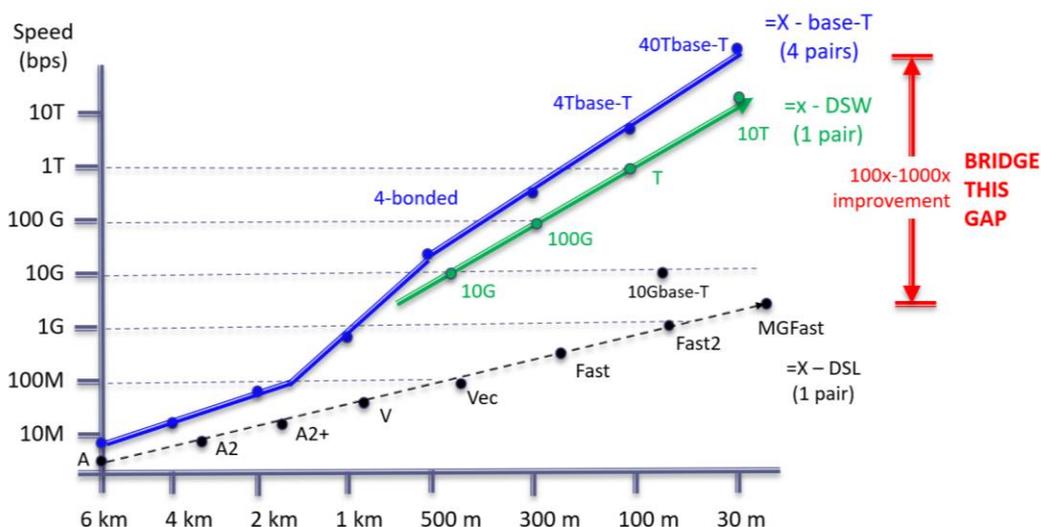
ASSIA Vision Includes Terabit Data Rate to Your Home *Dr. John Cioffi presents at TNO's Ultra-Fast Broadband Seminar*

REDWOOD CITY, Calif. — June 18, 2018 — [Adaptive Spectrum and Signal Alignment, Incorporated \(ASSIA®\)](#), the market-leading supplier of broadband and Wi-Fi diagnostic and optimization software solutions to carriers and cable operators, will present “Towards Terabit DSL”. Dr. John Cioffi, Chairman and CEO of ASSIA and Professor Emeritus at Stanford, is scheduled for June 20th at 15:40 at the [TNO Ultra-fast Broadband Seminar](#) in The Netherlands.

As first mentioned on May 10, 2017, Dr. Cioffi will share how today’s standard twisted pair in the home might enable future data transfer rates at 1000 times what is currently possible. Fiber-like speeds of 10 – 1000s of gigabits/second (Gbps) could use previously-unexploited waveguide modes of current copper infrastructure coupled with ASSIA’s vectored transmission capability. Dr. Cioffi will explore how vectored waveguide-mode use of copper phone lines is similar to 5G wireless’s Massive MIMO use of millimeter-wave transmission. He will also discuss how waveguide modes use frequencies above 100 GHz to enable extraordinary speeds.

When deployed, these extremely high frequency millimeter and sub-millimeter waves hold the possibility of increasing single-line data rates to terabits/second at 100-meter lengths on ordinary twisted pair phone wire. Speeds of 100 Gigabits/second could be achieved at distances over 300 meters, and speeds of 10 Gigabits/second could be achieved at distances over 500 meters.

xDSL Migration & “Terabit DSLs”





During this presentation, Dr. Cioffi will explain how 5G wireless often runs at 28 GHz and 39 GHz, while commercial microwave gear can run at 70 GHz and 90 GHz. Wireless transmission above 300 GHz (sub-millimeter wave) is being actively researched. Cioffi explains, “Early designs suggest link latency of 50-100 microsec is readily achievable, which would easily allow even the most stringent 5G latency specifications of 1ms or less to be achieved with Terabit DSLs.”

Today’s fastest DSL (G.fast) uses only 200 MHz of bandwidth, while wireless uses 25 times as much spectrum. Dr. Cioffi notes, “by working with my ASSIA colleagues Dr. Chan Soo Hwang, Dr. Ken Kerpez, and Dr. Ioannis Kanellakopoulos, we found a solution that uses higher frequencies over wires.”

Although ASSIA does not expect anyone to need terabits/s (Tbps) speed to their home today, Tbps would be of immediate value at service provider data centers and internet companies like Google and Microsoft. Tbps demand may still be a few years in the future, but 10-100 Gbps speeds are important right now to data-center networks. Rapid advances in augmented reality, virtual reality, and networks of video-based sensors in the home project to increase the need for access data rates by 10x to 100x, requiring high-speed ubiquitous connectivity to advance over the next decade. According to Dr. Cioffi, “Terabit DSL will play a critical role in serving the needs of that ecosystem with ultra-high-throughput and ultra-low-latency connectivity.”

Dr. Cioffi also notes that 5G data networks will drive even more demand for bandwidth. “Hundreds of thousands of 5G small cells and DOCSIS 3.1 cable nodes will require 5-20 gigabit/s backhaul. Most 5G cells will connect to a Cloud RAN controller that can use 100 gigabits/s to support dozens of cells.”

G.fast DSL, a deployed innovation which significantly increases performance on existing copper lines, provides a demonstration of how improving DSL speeds can help end users more efficiently than other connections. Dr. Cioffi explains, “AT&T and other telcos around the world are also deploying G.fast to apartments. G.fast speeds of 300 megabits to a gigabit can be supplied to every apartment. This differs from cable, which has shared connections that require multi-gigabit backhaul. Although fiber connections are fast, they require the expensive and time-consuming installation of new infrastructure. For this reason, fiber is and always will be expensive to deploy. There are a billion phone lines around the world which will now be able to deliver fiber-like speeds over existing copper infrastructure. Using the existing wires in place can dramatically reduce the cost of 5G networks.”

Dr. Cioffi will cover this topic in more detail during his presentation. For additional formation on this topic please see one of Dr. Cioffi’s previous presentations at <https://www.assia-inc.com/wp-content/uploads/2017/05/TDSL-presentation.pdf>

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About ASSIA:

ASSIA is a trusted partner with the leading market share of management and optimization software solutions for global broadband and residential access networks. ASSIA's *Expresse*[®] broadband system enables significant operational expense reduction for Internet Service Providers in the areas of subscriber care, of increased customer satisfaction, and of more connections upgrade to higher revenue-generating service tiers. ASSIA's *CloudCheck*[®] Wi-Fi optimization software enables service providers and enterprises to deliver premium digital experiences over residential Wi-Fi networks. ASSIA has more than 100 million broadband households under contract worldwide. Thanks to the company's product evolution and contributions to broadband standards, ASSIA is poised to help ISPs across the world as they upgrade their networks with next-generation G.Vector and G.Fast standards. For more information, visit www.assia-inc.com.

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