EPIC
Enable Practical Wireless Tb/s Communications with Next Generation Channel Coding

Newsletter
January 2018 - Issue 1

EPIC

In this Issue

Main Project Information and Objectives

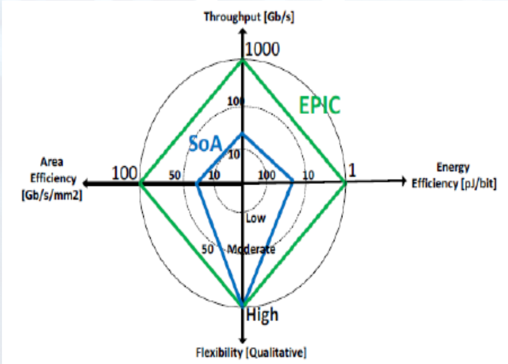
EPIC aims to develop a new generation of Forward-Error-Correction (FEC) codes in a manner that will serve as a fundamental enabler of practicable beyond 5G wireless Tb/s solutions and also to develop and utilize a disruptive FEC design allowing to advance state-of-the-art FEC schemes. Therefore EPIC will:

- design and implement next generation **Forward-Error-Correction for wireless Tb/s technology and Beyond-5G systems.**
- develop the principal **channel coding technology** for wireless Tb/s technology.
- devise a disruptive **FEC design framework** to unify algorithmic and implementation domains.
- validate and demonstrate the developed FEC technology in silicon tape-out and **provide first-in-class wireless Tb/s FEC chipset architecture block**.
- put the scientific excellence and contributions to wireless industry in the domain of B5G standardization and technology development at the centre of the project execution.

Message from the Coordinator

The intention of this newsletter is to open a new communication channel in order to provide news on the project progress and to discuss ongoing topics relevant to EPIC for internal and external project partners, stakeholders and all other interested bodies. For more detailed information about and around the project we warmly invite you to visit our project website: http://www.epic-h2020.eu. The project was officially launched with a kick-off meeting in September 2017. The EPIC consortium consists of 8 partners from 5 different countries. Thanks to excellent cooperation in the proposal creation the basis for a very promising collaboration has been set.

Technical Approach



EPIC is planned to run for 36 months and is subdivided into five technical work packages and the project, risk and innovation management. In **"B5G Wireless Tb/s Use-cases, Requirements and Roadmap"**, technical and performance requirements are set and expected target KPI values corresponding to each identified Tb/s use-case are determined. The FEC performance gap that is targeted to be closed to enable the target B5G use-cases and scenarios is identified and a roadmap study for the feasibility and successful realization of EPIC technology in the B5G systems is prepared. The main task of **"B5G FEC Design"** is the investigation of interrelations between code structure, encoding and decoding algorithms, communications performance, flexibility and efficient hardware architectures and their implementations in state-of-the-art technologies. The key objective of **"Link-level Simulations and Performance Comparisons"** is to validate and accurately assess the codes and algorithms developed. **"Prototyping/Virtual Hardware Design"** provides such implementation parameters related to CMOS technology node in order to provide a better view of the implementation limits and feasibility. The objective of **"Communication, Dissemination & Exploitation"** is to ensure utmost academic and commercial benefits by putting special emphasis on a detailed exploitation plan for EPIC both in academic and industry channels.

Key Data:

Start Date:	1st of September, 2017
End Date:	31st of August, 2019
Duration:	36 months
Project Reference:	760150
Project Costs:	€ 2.966.268,75
Project Funding:	€ 2.966.268,75
Consortium:	8 partners (7 countries)
Project Coordinator:	MMag. Martina Truskaller, coordination@epic-h2020.eu
Technical Leader:	Prof. Dr. -Ing. Norbert Wehn, when@eit.uni-kl.de
Project Website:	www.epic-h2020.eu

LinkedIn

FOLLOW US ON twitter

The EPIC project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760150.

EPIC

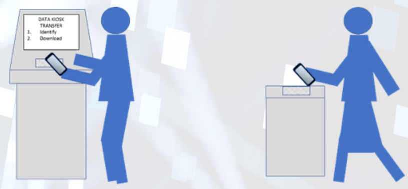
Enable Practical Wireless Tb/s Communications with Next Generation Channel Coding

Newsletter

January 2018- Issue 01

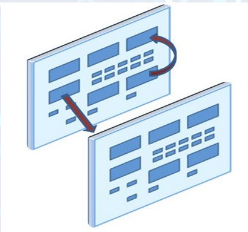
Relevant use cases for beyond-5G FEC design and challenges faced

The technical development of wireless communication systems allows us to do previously unimaginable things. For the future, **we foresee the demand on data rates to continue to increase**, reaching the terabit per second (Tb/s) range. A first step towards setting EPIC's goals is to identify potential beyond-5G use cases that call for advances in FEC technology. **Seven such use cases were identified** within the EPIC project as examples in the ongoing work of deriving FEC performance requirements, and performing a gap analysis between the use-case requirements and the current state of the art:



The wireless data kiosk : The wireless data kiosk is a machine allowing ultra-fast downloads of bulks of data that happen either at a designated station or e.g. while passing through a turnstile in the train station. It calls for the **development of new channel codes** that guarantee the transmission of huge amounts of data in an error-free manner.

Virtual reality: For very advanced systems involving a complex virtual layer for high-speed interactive tasks current technologies are not capable to meet the requirements on the quality of the content. In the context of EPIC, for the virtual reality use case, **the development of very energy efficient and highly flexible coding structures is the major challenge.** Compared to the other use cases investigated in EPIC, for the virtual reality use case we are facing a very challenging channel model due to the user mobility.



Intra-device communication: Intra-device communication refers to the communication between chips on the same Printed Circuit Board (PCB) or between chips on different PCBs in close range (approximately 1 mm up to 10 cm). Today, this communication is realized through wired buses. Realizing this so-called intra-device communication wirelessly instead, **will allow for reduction of pins on the integrated circuit, simplified wiring on the PCB, and easier portability.** But the transition from wired to wireless is far from simple. In the context of EPIC, the intra-device communication use case has its difficulty in the strict latency requirements as well as in the requirements on area efficiency and on power density.

Wireless fronthaul and backhaul: Fronthaul and backhaul (FH/BH) are key technologies that form the link between the base station antennas and the core of a cellular network. The backhaul realizes the connection between the base station Base Band Unit (BBU) and a more centralized element of the network whereas the fronthaul realizes the connection between the base station and the base station Remote Radio Head (RRH). It is expected that a mix of wired, wireless, digital- over-optical, and radio-over-optical will be used. A key challenge is here to realize the very high data throughput over a larger transmission range.

Data centers: Data Centers (DC) are main components of the IT systems that power various critical operations of institutions from enterprises of all sizes to internet-service providers. The DCs host storage, processing/ computation functions, and various applications under one umbrella, and serve end-user sub-systems or users. The storage-, processing- and computation functions of a DC usually scale orders of magnitude higher than conventional server-client set-ups. The recent evolution of high performance DCs necessitates further enhance-ments in scalability which place wireless technologies as potential connectivity solutions, and hence replacing wired/cable connectivity technologies in at least part of DCs. **The key challenge here is to realize ultra-high throughput, almost error-free, and very low-latency wireless communication links.**

Key Data:

Start Date:	1st of September, 2017	*Consortium:*	8 partners (7 countries)
End Date:	31st of August, 2019	*Project Coordinator:*	MMag. Martina Truskaller coordination@epic-h2020.eu
Duration:	36 months		
Project Reference:	760150	*Technical Leader:*	Prof. Dr. -Ing. Norbert Wehn when@eit.uni-kl.de
Project Costs:	€ 2.966.268,75		
Project Funding:	€ 2.966.268,75	*Project Website:*	www.epic-h2020.eu

The EPIC project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760150.

FOLLOW US ON twitter

EPIC

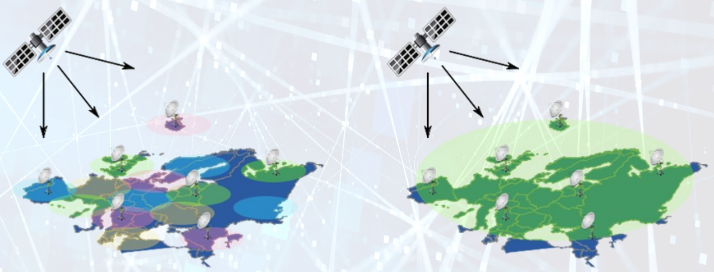
Enable Practical Wireless Tb/s Communications with Next Generation Channel Coding

Newsletter

January 2018 - Issue 1

Hybrid fiber-wireless networks: Fiber-optic technology is currently the primary connectivity solution for the majority of high-speed telecommunication systems and sub-systems including fixed-line infrastructure (e.g. core to end-user internet distribution), mobile infrastructure, and data centers. However, issues such as cost and physical limitations on deployment (e.g. due to terrain and/or permission requirements) put significant constraints on the utility of fiber solutions. Therefore, **wireless replacements and/or extensions of high-throughput communication links can be substantial complimentary solutions to the underlying fiber-optic links.** The design challenges are that the wireless link technology should match the requirements of the fiber technology, including ultra-high throughput, excellent error performance, and low-latency.

High-throughput satellites: High-throughput satellites are a new generation of satellite communication systems, **delivering a throughput several times higher than** conventional fixed satellite services. A main characteristics is the use of multiple smaller spot beams instead of one large beam over a specific coverage area. Here, the transmission range involves several thousand kilometres. It also addresses other types of services, as latencies in of hundreds of milliseconds are inevitable.



Past events

- An Austrian press release was published in September 2017, to announce the EPIC project in German.
- The EPIC general presentation, the project leaflet and an announcement letter are available on the project website
- In October 2017, Authors from partner Kaiserslautern university presented a publication at the IEEE International Workshop on Signal Processing Systems (SiPS). The publication "Advanced Wireless Digital Baseband Signal Processing Beyond 100 Gbit/s" was accepted and is available on open access platform Zenodo.
- IDCC participated in a workshop at the 5G forum on 22nd of December, 2017 in Seoul, Korea.

Upcoming events

- 7th of March, 2018 Thz workshop at the European commission in Brussels
- 18th - 21st June, 2018 EUCNC – European Conference on Networks and Communications
- 3rd - 7th December 2018 ISTC 2018 - International Symposium on Turbo Codes & Iterative Information Processing
- The consortium plans to organize a special session on "Next generation Channel Decoding towards 1Tb/s"

Key Data:

Start Date:	1st of September, 2017	*Consortium:*	8 partners (7 countries)
End Date:	31st of August, 2019	*Project Coordinator:*	MMag. Martina Truskaller coordination@epic-h2020.eu
Duration:	36 months	*Technical Leader:*	Prof. Dr. -Ing. Norbert Wehn when@eit.uni-kl.de
Project Reference:	760150	*Project Website:*	www.epic-h2020.eu
Project Costs:	€ 2.966.268,75		
Project Funding:	€ 2.966.268,75		

The EPIC project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 760150.

FOLLOW US ON twitter