**IEEE P802.15**

**Wireless Personal Area Networks**

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| Abstract | Input from the Horizon 2020 iBROW Project to the TG3d Call for Contributions to the Response on the Liaison Statement from ITU-R WP1A |
| Purpose | Providing technical input to the response on the Liaison Statement from ITU-R WP1A |
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**Input from the Horizon 2020 iBROW Project to the TG3d Call for Contributions to the Response on the Liaison Statement from ITU-R WP1A**

# The iBROW-Project

iBROW (Innovative ultra-BROadband ubiquitous Wireless communications through terahertz transceivers) is a collaborative research project supported by the European Commission through Horizon 2020 under Grant Agreement 645369 [1,2]. The project started on 1 January 2015 and runs until 31 December 2017.

* 1. **Project Goals**

The iBroW project addresses the growing requirement for high bit rate short range wireless communication. To achieve wireless data rates of multiple tens of Gbps resonant tunneling diode (RTD) transceiver technology will be applied enabling seamless interfacing with optical fibre networks. iBROW will achieve a novel RTD device technology on a III-V on Si platform integrated with laser diodes and photo-detectors. This approach offers a simple technology that can be integrated into both ends of a wireless link, consumer portable devices and fibre-optic supported base stations.

* 1. **Consortium**

iBROW consists of 11 partners from four different countries and includes large industrial partners (Alcatel-Lucent/Germany, IQE/United Kingdom), SMEs (Compound Semiconductor Technologies/United Kingdom, Optocap (United Kingdom), Vivid Components/Germany), research & development centers (CEA-LETI/France, III-V-Labs/France, INESC/Portugal) and academic partners (University of Glasgow/United Kingdom, TU Braunschweig/Germany, University of the Algarve/Portugal).

* 1. **Expected Output**

The expected output of iBROW most relevant for this call for contribution is a test-bed for the demonstration of > 10 Gbps wireless communication between several stand-alone prototype nodes at ~300 GHz. On the technological side iBROW considers also packaging aspects and low cost manufacturing, which is based on direct growth of III-V RTD layers on a Si substrate, direct wafer bonding between III-V & Si substrates, potential large diameter wafers (up to 200 mm OD) and simple integration with CMOS [3].

# Target System Overview (based on [4])

RTD based devices open the chances for the realization of high bandwidth fixed radio access technologies which may allow for wireless bit rates in the range of several tens of Gbit/s.

The target application for such envisaged RTD transceivers is mainly in the scope of indoor applications because these devices will support quite low RF-power in the early stage of realization. For such indoor applications a variety of possible scenarios is under investigation like:

* high speed data links for office applications
* data links for home applications like video and gaming,
* realization of coverage for shopping malls, airports, railway stations,
* realization of access for on the fly networks like music or sports events



Figure 1 – Schematic representation of the iBROW target application scenario

Used carrier frequencies will be in the range up to 300GHz with clear focus to 90 GHz, 160GHz and 300 GHz. In the medium timeframe especially the 300 GHz carrier frequency will be of interest for 5G applications and beyond. The target output power will be in the range of 0-10dBm to support the mentioned indoor application scenarios like office, home, lecture hall, stadium and campus. As part of this power related topic a kind of output power roadmap for the RTD device could be a helpful indicator regarding potential future application scenarios.

Part of iBROW will be the optical connection of the fiber to the device to support the high target bandwidth, see Figure 1. There are a few reasons for resorting to concepts and technologies known from passive optical networks (PONs): Future PON systems address data rates which are in a similar range (several tens of Gbit/s up to hundreds of Gbit/s) as those discussed in this project, and they as well face harsh cost constraints. By finding synergies between our targeted system and PON system solutions, we might be able to share the same or similar hardware and benefit from the reduction of costs in PON systems as technologies mature.

# Application Scenarios

iBROW has defined three application scenarios, for which simulations will be performed and channel measurements will be made[4]. The different scenarios taken into account are the following:

* Small Office Scenario with a size of about 5m x 4m x 2.6m: intended for the investigation of small single office applications with static users
* Meeting Room Scenario with size of about 14m x 10m x 3.3m: intended for investigation with a medium numbers of users, which may be moving
* Auditorium Scenario with a size of about 16m x 14m x 3.7m: intended for investigation with a large numbers of users, where a few may be moving.

# System Characteristics

The targeted system characteristics for the 300 GHz system are data rates > 10 Gbps achieved by a system bandwidth of up to 50 GHz and 0 to 10 dBm output power using antennas with a gain of 20-30 dB on both sides of the link. Hence, the expected EIRP will be in the order of 20-40 dBm.

# References

[1] http://ibrow-project.eu/

[2] Kürner, T., “Innovative ultra-BROadband ubiquitous Wireless communications through terahertz transceivers - H2020 iBROW,” IEEE 802.15 Document 15-15-0516-00-003d, Waikoloa/Hawaii, July 2015.

[3] iBROW project flyer

[4] iBROW Deliverable 1.3, Report On Target Application Scenarios And Requirements, (confidential deliverable)