WiserBAN

Project Acronym: WiserBAN

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CSEM Centre Suisse D'Electronique et de Microtechnique SA – Recherche et Development	CSEM	CH
Commissariat a L'Energie Atomique et aux Energies Alternatives	CEA	FR
Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung E.V.	FRAUNHOFER	DE
Valtion Teknillinen Tutkimuskeskus	VTT	FI
Technische Universitat Berlin	TUB	DE
Alma Mater Studiorum-Universita di Bologna	UNIBO	IT
Sorin CRM SAS	SORIN	FR
EPCOS SAS	EPCOS	FR
MED-EL Elektromedizinische Geraete GmbH	MED-EL	AT
Siemens Audiologische Technik GmbH	DE-SAT	DE
Debiotech S.A.	DEBIOTECH	CH
SignalGenerix Ltd	SG	CY
RTD TALOS Ltd	TALOS	CY

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Smart miniature low-power wireless microsystem for Body Area Networks

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Author(s): Christoph Pregizer (DE-SAT)

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Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Revision History

Version	Date	Changed page(s)	Cause of change	Partner
V0.1	27/03/2014	All	First Draft	DE-SAT
V0.2	18/7/2014	All	Finalizing the document	TALOS

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Contents

Executive Summary

Work Package 7 (WP7) of the WiserBAN project aims at maximizing the International visibility of the WiserBAN concept, technical results and partners throughout different channels, within a common agreed strategy.

Deliverable 7.8 "Dissemination Seminar or Workshop" is one of the deliverables of Task 7.5 "Exploitation, IPR, Roadmapping and Business Model". It provides a report on a dissemination and exploitation event held at the "European Conference on Networks and Communications" from June 24th to 26th, 2014 in Bologna, Italy.

In order to showcase WiserBAN's technologies and results, an exhibition booth was set up featuring several posters and demonstrators completed during the project. Approximately 500 representatives from industry, academia and government attended the conference and approximately10% of those visited the booth for a more in-depth discussion of the WiserBAN project and technologies.

Conducting this deliverable at a larger conference allowed for a high level of interaction with representatives from relevant industries. The decision of the WiserBAN consortium to use such a setup thus proved very beneficial as compared to an independent WiserBAN exploitation event.

1 Introduction

WiserBAN concerns Wireless Body Area Networks (WBAN), and is about improving personal sensing capabilities by using miniature, unobtrusive, long-lifetime sensor nodes.

WiserBAN's target was to deliver innovative wearable and implantable radio microsystems and to enable concrete exploitation perspectives in a broad range of industrial segments such as healthcare, bio-medical, wellness, and lifestyle.

This document reports on a dissemination and exploitation event held at the "European Conference on Networks and Communications" from June 24th to 26th, 2014 in Bologna, Italy.

2 The Event "EuCNC"

The European Conference on Networks and Communications 2014 (EuCNC) was held from June 23rd to June 26th in Bologna, Italy. Apart from presentations, sessions, workshops, and posters, an important part of the conference was an exhibition area in the foyer of the venue. There, companies, organizations and European Projects concerned with networks and communications had the opportunity to showcase the results of their projects.

The event attracted approximately 500 visitors from academia and from the industry, allowing for a direct exchange on how to bring recent research results into industrial application. The event thus provided a good platform for promoting WiserBAN's results to a wide range of representatives and to test interest in WiserBAN's technologies. Selected institutions and companies represented at the conference are listed below:

Industry

- Alcatel-Lucent
- Orange Labs
- Nokia Siemens Networks
- Telecom Italia
- Huawei
- Nokia
- Ericsson
- Intel Corporation
- Selex ES
- siae microelettronica

Academia

- University of Bologna
- Imperial College London
- University of Palermo
- Technische Universität Dresden
- Politecnico di Torino
- Colorado State University
- Karlsruhe Institute of Technology
- University of Surrey
- Trinity College
- EPFL, Switzerland

Other Organizations

- European Commission
- IEEE
- IEEE Communications Society
- cnit

During the M42 in Meeting in Paris, the decision was taken by the WiserBAN consortium to use this conference to support exploitation activities by an exhibition booth at EuCNC for this deliverable. The rationale behind was that a conference like the EuCNC would draw a higher number of participants and interactions than a dedicated dissemination workshop held independently from a larger event. Considering the described setup of the conference and the number of participants, this proved to be a good decision, also because a number of representatives from UNIBO and the exploitation manager from DE-SAT were in attendance at the conference and thus able to actively promote WiserBAN's result at the booth.

3 The Booth

The booth was set up by a joint effort between UNIBO and DE-SAT, relying on contributions from most of the other partners as well. The items showcased at the exhibition booth are described in this section.

During the conference, Chiara Buratti, Riccardo Cavallari, and Stefan Mijovic were present at the booth representing UNIBO. WiserBAN's exploitation manager Christoph Pregizer was present from DE-SAT.

3.1 Setup

The target for the booth was to present WiserBAN's technology bricks with the support of posters and demonstrators provided by different partners. In order to foster interaction with the participants of the conference, a description of the most relevant technology bricks was presented. The mentioned poster along with other posters is described in section 3.2 "Posters". Section 3.3 "Demonstrators" and section 3.4 "Pictures" describe further materials used at the booth.

3.2 Posters

WiserBAN: Smart Micro-System RF Module for HealthCare Applications (prepared by Eric Mercier, CEA)

WiserBAN: Smart Miniature Low-Power Wireless Microsystem for Body Area Networks – Technology Bricks (prepared by Christoph Pregizer, DE-SAT)

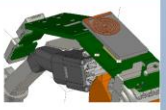
WiserBAN

Smart Miniature Low-Power Wireless Microsystem for Body Area Networks

Key Technology Bricks

Miniature Active and Passive Antennas for 2.4 GHz Band

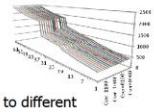
- Various small-size active and passive antenna designs for low-power wireless devices at 2.4 GHz
- Realized on PCB substrates, on IPD or LTCC platforms



Partners: csem, leti, MED-EL, VTT

Antenna Impedance Sensing and Tuning (AIST)

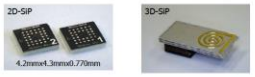
- Through sensing and tuning, it is ensured that the antenna is always properly matched to the radio
- Automatic adaptation to different use cases and to variations in antenna near-field environment
- CMOS IC implementation and related SW



Partners: VTT, SignalGeneriX, SIEMENS

2D / 3D System-in-Package

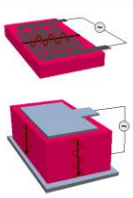
- Advanced packaging through heterogeneous integration of components
- Advantage regarding package miniaturization in x, y, z



Partners: TU Graz

Piezo Components

- New technique to develop High-Frequency / High Impedance / Narrow Band filters
- Surface Acoustic Wave (SAW) RF & IF Filters
- Bulk Acoustic Wave (BAW) high frequency resonator for clock system
- Key differentiation is thin film packaging for both SAW & BAW:
  - DSSP (Die Size SAW Package) for SAW
  - TFAP (Thin Film Acoustic Package) for BAW



Partners: EPCOS, leti

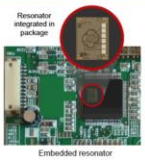
Various RF IC Building Blocks / System-on-Chip

- RF Silicon: RF CMOS circuits implemented in WiserBAN SoC
- Digital Baseband (transmitter and receiver parts, incl. relevant firmware)
- Low-power VGA and ADC to be used for digital-oriented RF receiver front-ends
- Integration of icyflex 32-b DSP incl. peripherals, HDK and SDK

Partners: csem, leti, SignalGeneriX

Silicon Resonator

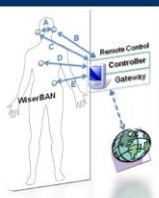
- Low frequency silicon resonator for radio oscillator designs for low-power RF devices
- Fabricated on silicon for different connections



Partners: VTT, Fraunhofer IZM

Self-Organizing, Adaptive, Flexible & Low-Power BAN Protocols

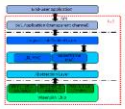
- Unique: common protocol architecture for several apps
- Flexible : Various MAC & topologies supported
- QoS through reliability, latency, etc.



Partners: leti

End-User Application Interface

- Communication Protocol Definition for Data Exchange from End User Application Device to Wiserban SoC



Partners: SIEMENS, DEBIOTECH, MED-EL, SORIN GROUP

Acknowledgements

The project is supported by funding under the 7th Framework Programme of the European Union – Project Number: 257454

Contacts

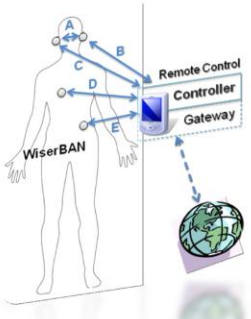
WiserBAN Exploitation Manager: Christoph Pregizer, Siemens Audiology Solutions
christoph.pregizer@siemens.com

Project website:
http://www.wiserban.eu

WiserBAN: Self-Organizing, Adaptive, Flexible & Low-Power BAN Protocols for HealthCare Applications (prepared by Eric Mercier, CEA and Riccardo Cavallari, UNIBO)

Self-organizing, adaptive, flexible & low-power BAN Protocols for HealthCare Applications

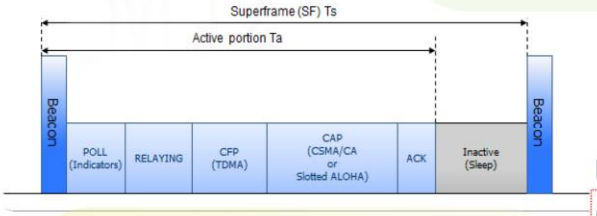
Unique : Common protocol architecture for **several apps**
Flexible : Various MAC & topologies supported
QoS through reliability, latency, etc...



Superframe-based MAC
IEEE 802.15.4- / 15.6-based with innovative functionalities

LPL-based MAC
Low-energy, aperiodic and loose traffic
Dynamic and Automatic **relaying mechanisms**
Mitigated shadowing impact on PER

APP profiles :
Autonomously and dynamically **adaptive**
Trade-off between QoS and energy consumption
Adapted to **heterogeneous** traffics

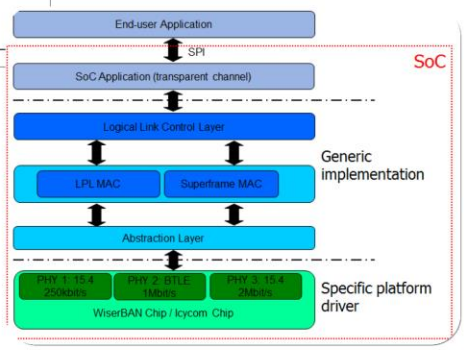


WiserBAN software architecture

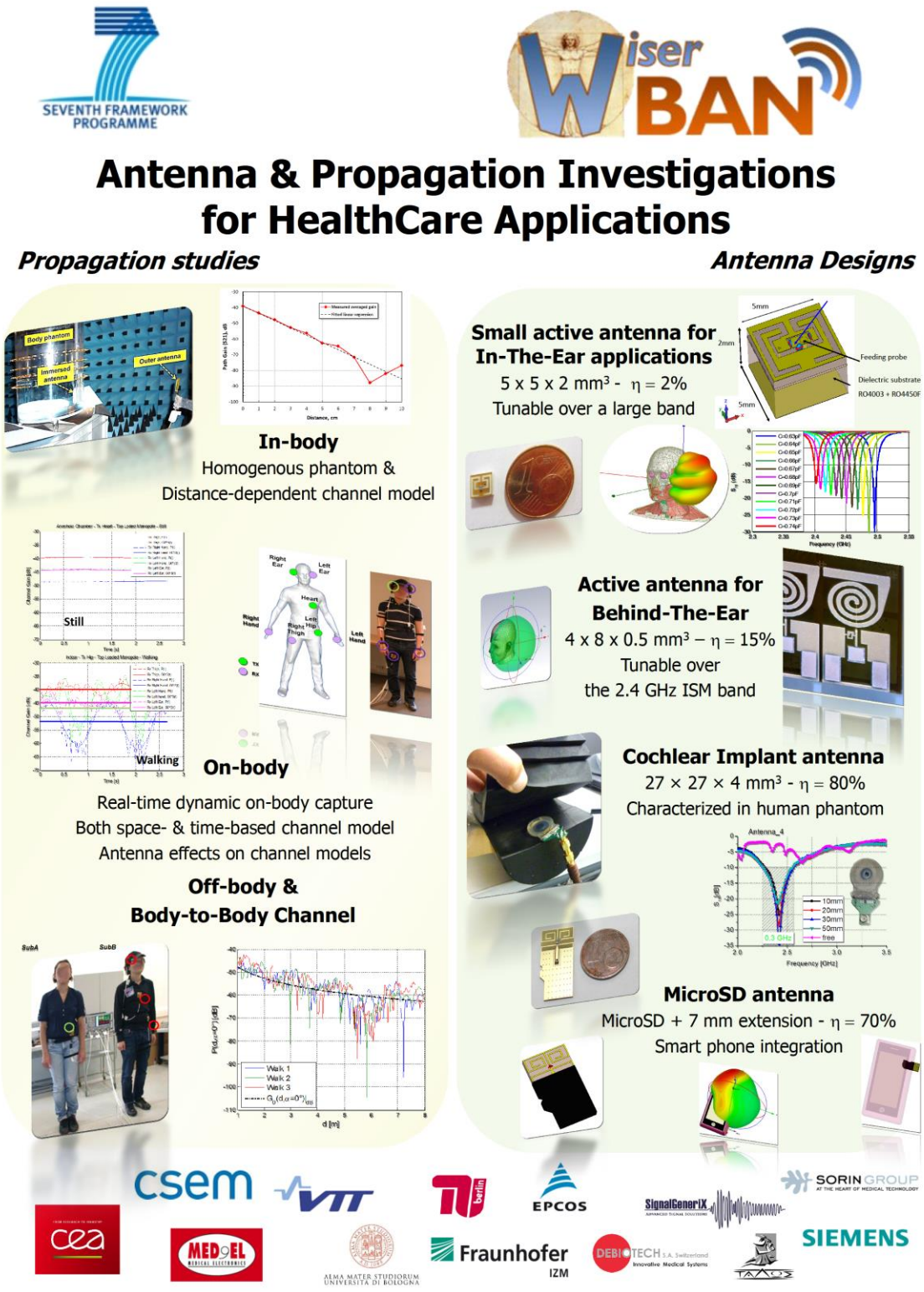
Hardware Abstraction Layer
Protocol stack to specific drivers API

Medium Access Control Layer
Network Formation & Maintenance
Channel Access & Synchronization

Logical Link Control Layer
Data Flow to MAC layer
Proper data traffic and **QoS**.



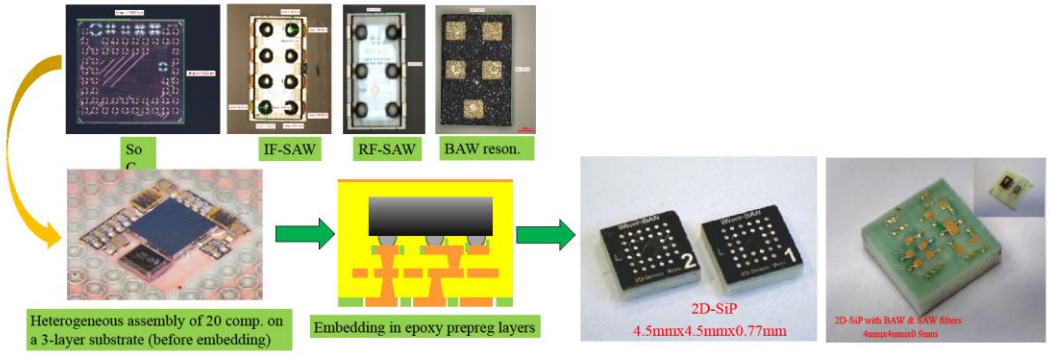
WiserBAN: Antenna & Propagation Investigations for HealthCare Applications (prepared by Eric Mercier, CEA)



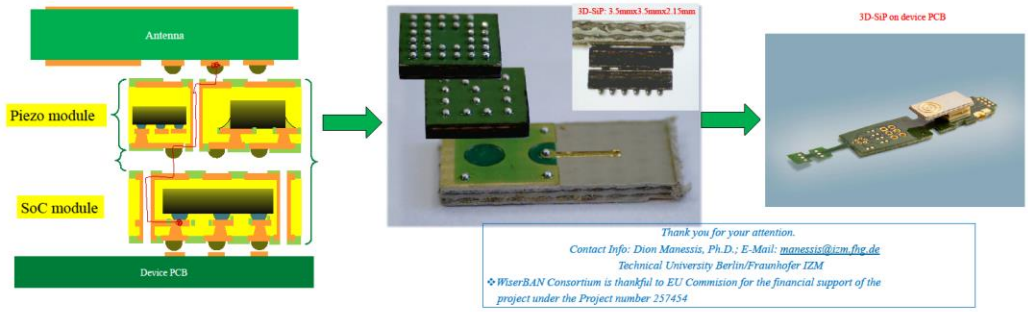
WiserBAN: Manufacturing of Embedded System-in-Packages for Miniaturised Medical Microsystems (prepared by Dionysios Manessis, TUB)

Manufacturing of embedded system-in-packages for miniaturised medical microsystems

- OBJECTIVES
  - Development of 2D-SiP (lateral heterogeneous integration of components)
  - Development of a 3D stacking technology of the 2D-SiPs, with active antenna on top
- 2D-SiP manufacturing (SoC & piezoelectronics in 1 layer)



- 3D-SiP manufacturing for medical wearable devices



Thank you for your attention.
Contact Info: Dion Manessis, Ph.D.; E-Mail: manessis@izm.fhg.de
Technical University Berlin/Fraunhofer IZM
WiserBAN Consortium is thankful to EU Commision for the financial support of the project under the Project number 257454

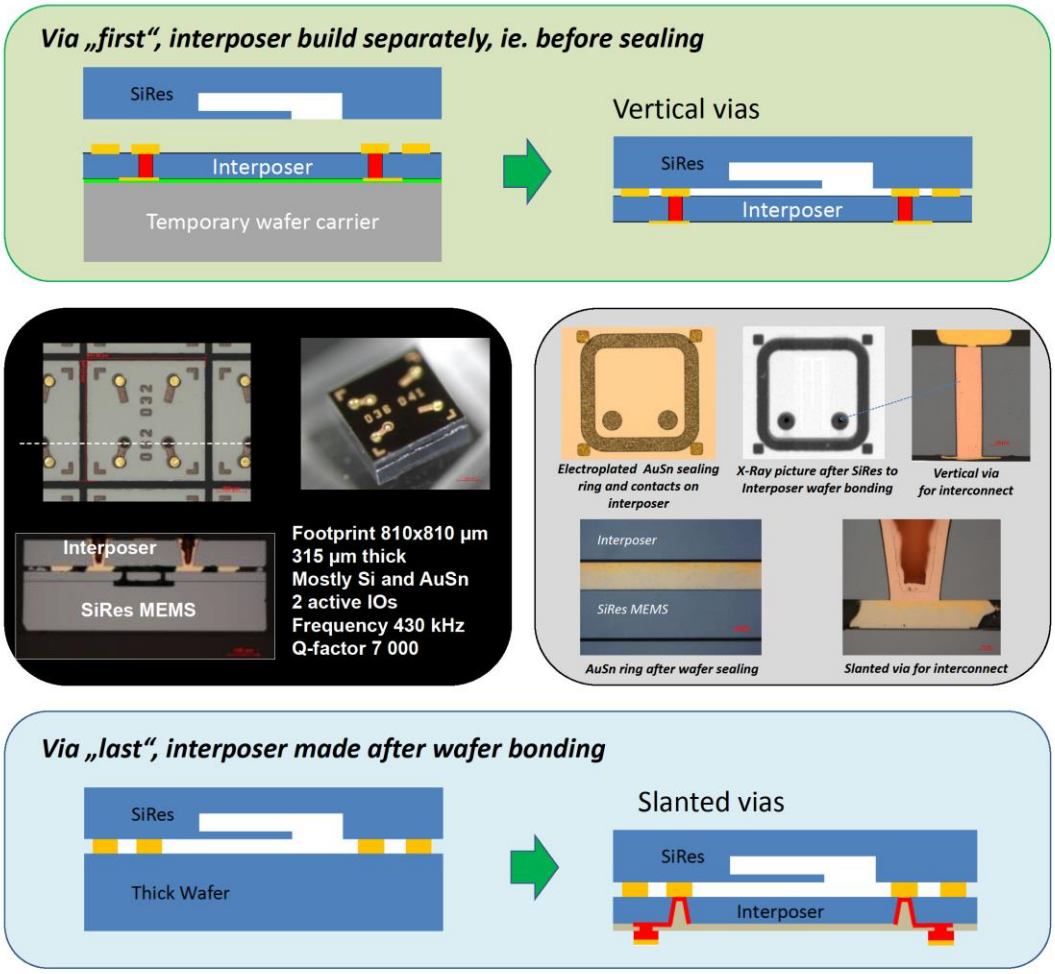
csem MED-EL Fraunhofer IZM TAMOS EPCOS
cea ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA SORIN GROUP AT THE HEART OF MEDICAL TECHNOLOGY SIEMENS
VTT DEBIOTECH S.A. Switzerland Innovative Medical Systems SignalGeneriX

WiserBAN: Wafer Level Packaging of MEMS Silicon Resonator (SiRes) using Interposer Technology (prepared by Kai Zoschke, IZM and Jyrki Molarius, VTT)

WiserBAN
Smart miniature low-power wireless microsystem for Body Area Networks

Wafer level packaging of MEMS Silicon Resonator (SiRes) using interposer technology

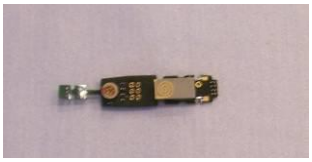
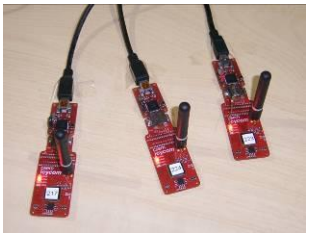
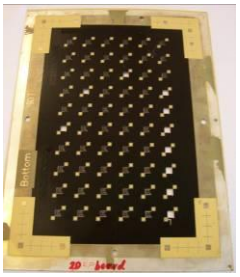
- Full silicon packaging
- AuSn plating for sealing rings and electrical interconnects
- Hermetical sealing by Au/Sn wafer bonding under vacuum
- TSV and temporary wafer carrier for interposer processing, handling and wafer bonding



Contacts
Interposer technology, Wafer bonding: Kai.Zoschke@izm.fraunhofer.de
SiRes MEMS technology: Jyrki.Molarius@vtt.fi

3.3 Demonstrators

The following demonstrators have been used to showcase WiserBAN's technology bricks at the booth:

Demonstration	Description	Pictures
Hearing Aid Mechanical (DE-SAT, TUB)	Showcasing integration into miniature Hearing Aid on Hearing Aid Device PCB	
Cochlear Implant Mechanical (MED-EL)	Showcasing integration into Cochlear Implant	
WiserBAN Protocol (UNIBO, CEA)	Self-Organizing, Adaptive, Flexible & Low-Power BAN Protocols	 
2D and 3D SiP Mechanical Integration (TUB)	Showcasing mechanical integration of heterogeneous systems: - 9"x12" boards with non-sawn 2D-SiP samples - Cut 2D-SiP samples - 3D-SiP samples	 

3.4 Pictures

The Booth Setup at EuCNC 2014 in Bologna (Riccardo Cavallari, Stefan Mijovic)

Interactions with Conference Participants at EuCNC 2014 in Bologna

4 Summary and Conclusion

The WiserBAN exhibition booth at the "European Conference on Networks and Communications" from June 24th to 26th, 2014 in Bologna, Italy, has fostered worthwhile interactions with industry and academia. Approximately 40-50 participants of the conference visited the WiserBAN booth, which represents around 10% of the total participants. Among them were representatives from Toshiba, Huawei, imec, and several Italian and international universities.

There was a wide agreement between the visitors that the technologies showcased – especially the fact that the system provides a small size, low-power solution – are well in line with the challenges the industry faces in terms of body area networks. The demonstration of the protocol fostered discussions about standardization and the high need for interfaces that can be addressed from various components in order to enable innovations for example in the area of "Internet of Things". An additional topic was the potential symbiosis between future communication technologies like 5G and body area networks. This could prove an area where WiserBAN's technologies could have a real impact.

Although there were good interactions with regard to the utilization of the showcased technologies and although it was emphasized by many visitors that the targets of the WiserBAN project were spot on, a more comprehensive demonstration of WiserBAN's results would have been a crucial starting point towards opening further exploitation perspectives.

As a concluding remark it should be highlighted that selecting a conference like the EuCNC for this deliverable definitely caught more and more targeted attention than a dedicated workshop on the topic independent from such a larger event. Despite the challenges with regard to limited demonstration of WiserBAN's results, the advantage of having a significant number of relevant representatives from the technology field present at the conference proved valuable with regard to the level of interaction.