



上海交通大学
Shanghai Jiao Tong University

SJTU for UK-China Science Bridges Project

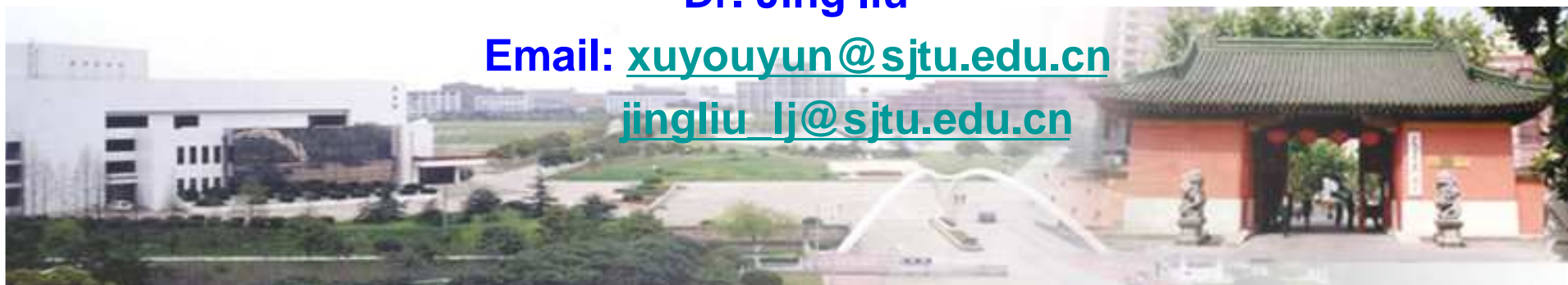
Department of Electronics Engineering
Shanghai Jiao Tong University

Prof. You Yunxu

Dr. Jing liu

Email: xuyouyun@sjtu.edu.cn

jingliu_lj@sjtu.edu.cn



Institute of Wireless Communication Technology
Department of E.E., SJTU <http://iwct.sjtu.edu.cn>

Outline

- ❑ Shanghai Jiao Tong University
- ❑ **Institute of Wireless Communication Technology**
- ❑ **Research and Development Activities at IWCT**



About SJTU

□ Shanghai Jiao Tong University (SJTU)

- ❖ One of the oldest universities in China, founded in 1896;
- ❖ Supported by “211” and “985” programs of the government;
- ❖ 6 national key labs, 4 national engineering centers;
- ❖ 15 academicians of the Academy of Sciences;
- ❖ 20 academicians of the Academy of Engineering;
- ❖ SJTU boasts 21 academic schools. Besides, it also has Continuing (adult) Education School, Online Learning School, International Education School, and a Vocational School.
- ❖ 19,596 undergraduates
- ❖ 9,173 candidates for Master's Degree
- ❖ 4,629 for Doctor's Degree.





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Affiliation of IWCT



上海交通大学

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电子信息与电气工程 学院

School of Electronic, Information and Electrical Engineering

- ❑ Dept. of Electronic Engineering is the biggest one in SJTU
 - ❑ Wireless Communication
 - ❑ Optical Communication (a national key lab)
 - ❑ Image processing and communication etc.

- ❑ The Institute of Wireless Communication Technology (IWCT) was founded at Shanghai Jiao Tong university in **2001**. Faculty affiliated with the institute are mainly **drawn from the radio communication** and relative research directions.



Papers and Contributions

- ❑ For the past 3 years, more than 150 papers were published and accepted in domestic and overseas Journals and proceedings (21 papers are indexed by Science Citation Index and 95 indexed by Engineering Index), and approximately 90 patents have been applied to the National Copyright Administration of the P.R.C..
- ❑ For more information and completed paper list, please check the website of our institute 😊



□ Faculties

- 4 Ph.D Tutors (Communication and Information System)
- 6 Master Tutors (Communication and Information System)
- 5 Ph.D-hold Lecturers
- 2-4 standing postdoctoral positions
- more than 10 Guest professors /researchers

□ Graduate Students

- 15 Ph.D candidates
- 60 Master candidates
- Annually graduated: 2-4 persons with Ph.D degree,
about 20 persons with Master degree



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R&D Research Experience

- ❑ **Digital mobile cellular communications: since 1990**
 - ❖ IS-95 and GSM systems (1990s)
 - ❖ CDMA and digital modulation and coding (1995s)
 - ❖ Chinese 3G (C3G)---WCDMA /w Turbo Coding (1998-2001)
 - ❖ China B3G/4G FDD mode 20Mbps trial system (2001-2003)
 - ❖ China B3G/4G TDD mode 100Mbps trial system (2003-2006)
- ❑ **Digital TV terrestrial broadcasting system: since 1998**
 - ❖ Digital TV Terrestrial Broadcasting such as ADTB-T (Chinese standard) and DVB-T (1998-2006)
 - ❖ Handset Mobile TV: DVB-H CMMB (2005-)
- ❑ **Other Wireless/mobile Communication Technologies: since 2002**
 - ❖ High-end channel codec implementation (1998 -)
 - ❖ Wireless Sensor Network Critical Issue (2002-)
 - ❖ Wireless Video Transmission for special scenarios (2003-)
 - ❖ Cognitive Radio Network (2006-)
- ❑ **Wireless Data Access Systems : since 2001**
 - ❖ IEEE 802.15 Bluetooth (2001-2002)
 - ❖ IEEE 802.11 WiFi (2002-2003)
 - ❖ IEEE 802.16d/e WiMax (2003-2006)
 - ❖ IEEE 802.16m/j Advanced WiMax Phase II (2006-)
 - ❖ IEEE 802.15 MBAN (2007-)



Sources of R&D Projects

- National Foundation of Science:6
- National “863”Project:6
- National “973”Project:1
- University “211”, “985” support Project:4
- Shanghai Government Project:3
- Enterprise Collaborative Projects:
 - Qualcomm., DoCoMo, Siemens, Adaptix, Sharps, Boeing, Mobile China, Huawei, ADI, Nokia, Leader Tech., ...
- University Collaborative Projects:
 - Domestic: BUPT, HUST,UEST,...
 - Overseas: Washington Univ., Georgian Tech, KTH, Uppsala Univ.,....
- Private research interests



Research areas related to wireless communications and networks

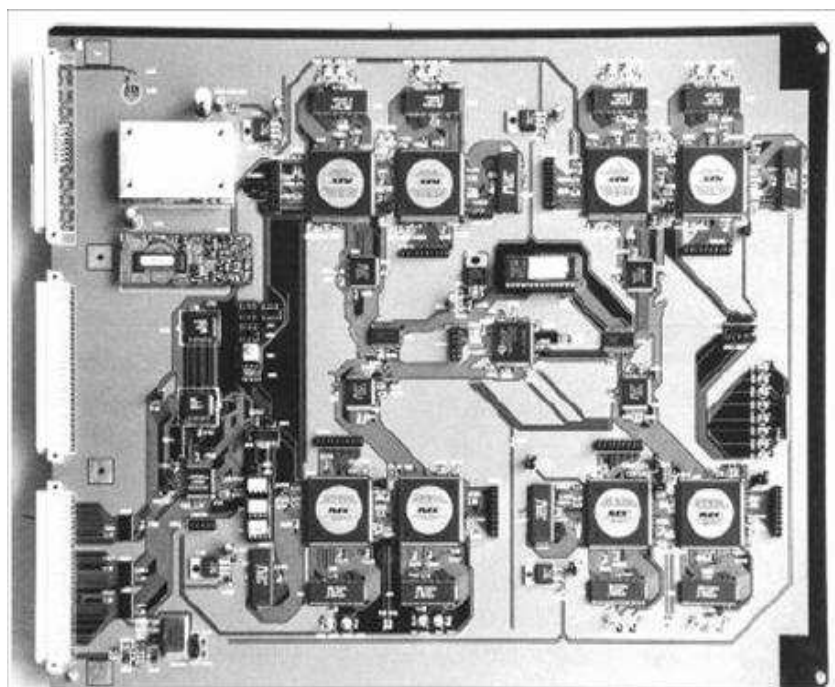


- Cellular Mobile Communications
- Digital Broadcasting Communications
- Data Access Communications
- LDPC Coding/Decoding



R&D Activities for Cellular Mobile Communications

- Advanced Channel Coding Research & Development (1999~2001)



4 CDU Channel Card for Base Station



Single FPGA CDU Module for MT

**Channel Decoding Unit (CDU)
Design and Implementation for
The 3rd Generation System of
China (C3G) ---- the WCDMA
Trial System.**



R&D Activities for Cellular Mobile Communications



Hardware platform for
 4×4 MIMO trial system
(B3G baseband section)



R&D Activities for Digital Broadcasting Communications

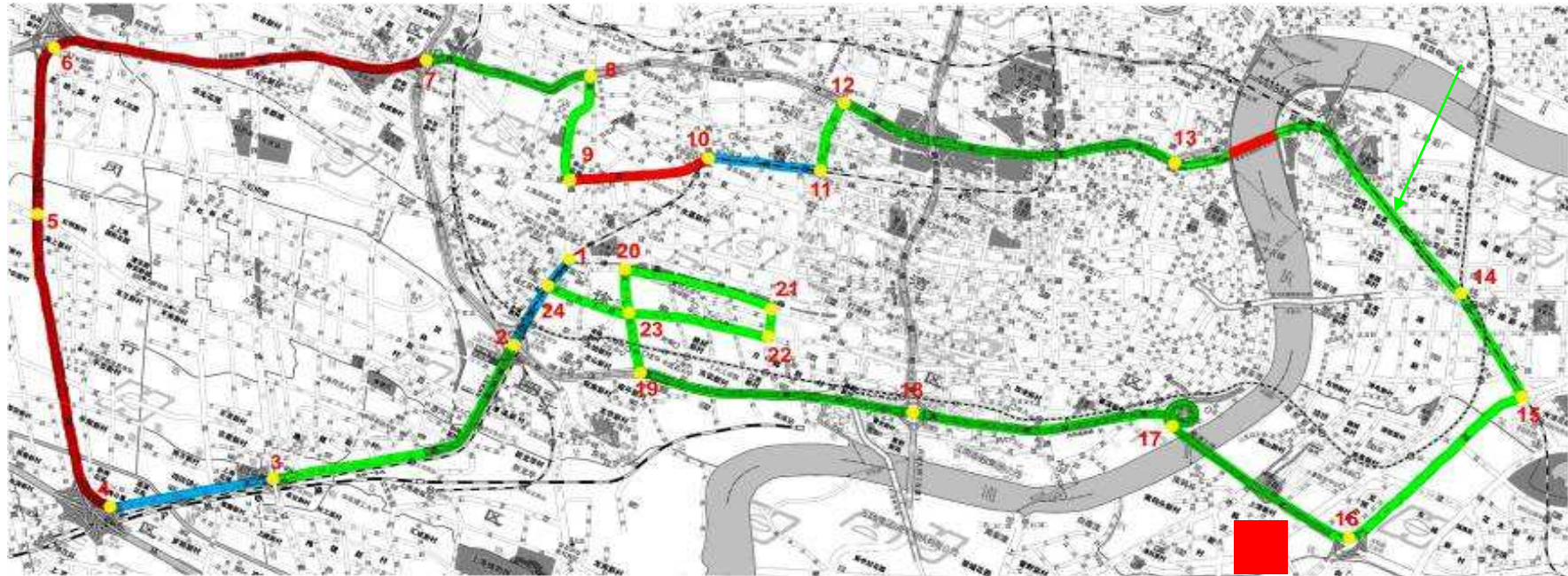
Advanced Digital Television Broadcasting for Terrestrial (ADTB-T) (1998~2006)

This system can offer High Definition Television (HDTV) program receiving for fixed users and Standard Definition Television (SDTV) program for high-speed mobile user (ever tried the mobile speed up to 443km/h).



R&D Activities for Digital Broadcasting Communications

Successfully receive ratio of ADTB-T and DVB-T in Shanghai test field



- Green : 100%
- Blue : >95%
- Yellow : >90%
- Purple : >85%
- Red : <85%

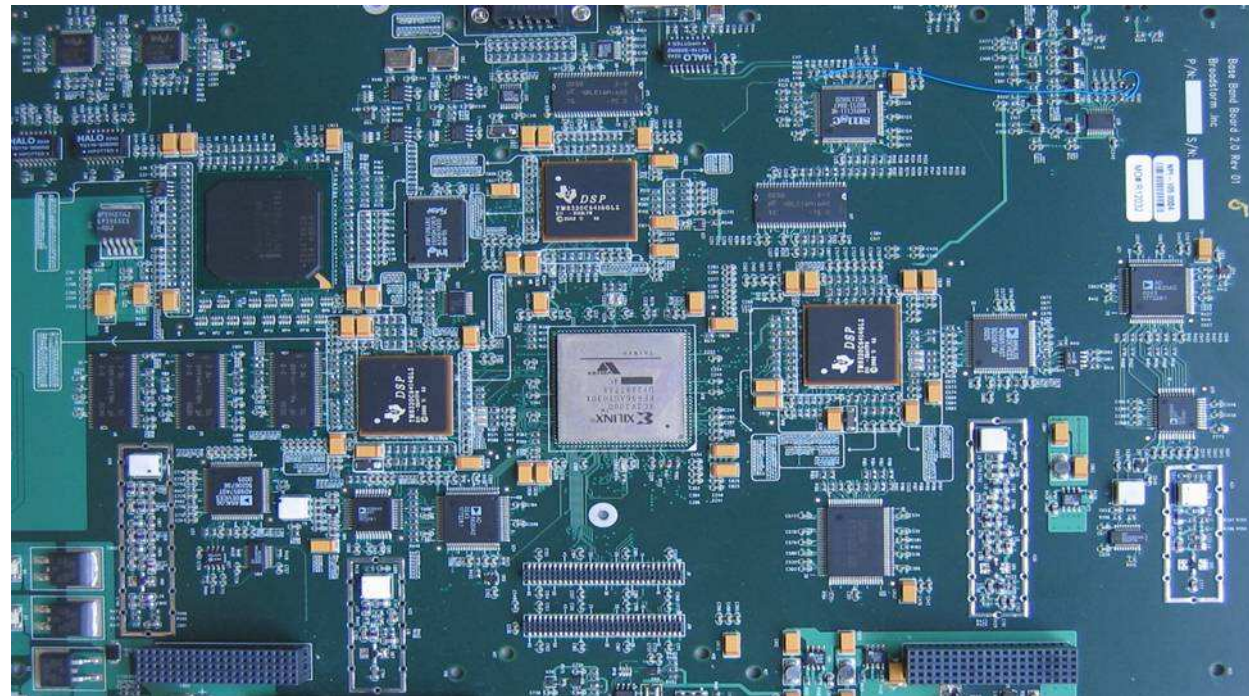
■ ADTB-T 83.62%



R&D Activities for Data Access Communications

Research on IEEE 802.16d and its trial system design (2003~2006)

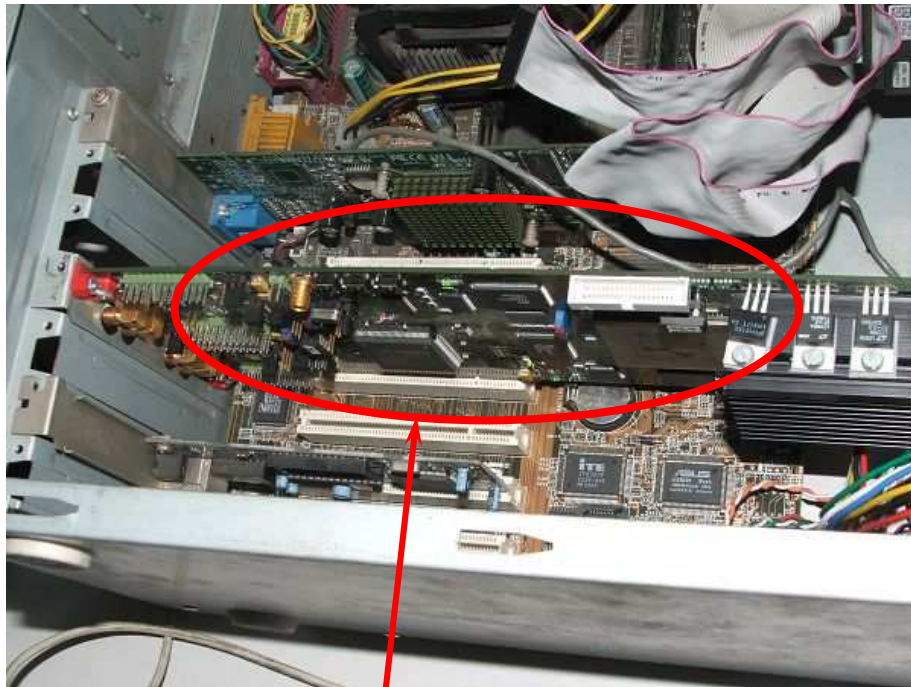
A joint project carried out by SJTU and Adaptix Ltd. , which aimed to fast entering WiMAX market around the world in the near future.



Key processing modules designed for IEEE802.16d OFDM system have been verified upon hardware platform.

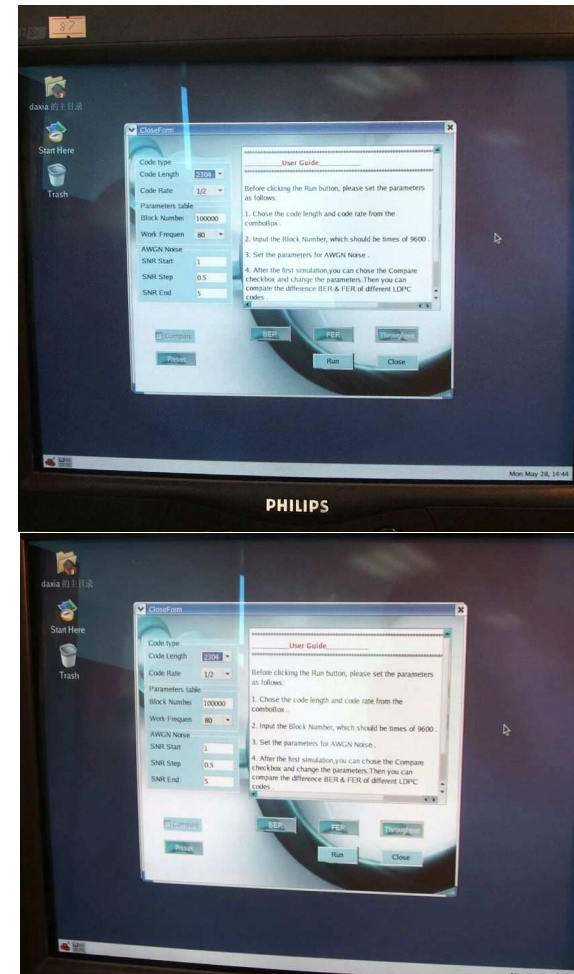


LDPC Coding/Decoding (FPGA verification platform)



Verification platform

High speed LDPC codec design and implementation

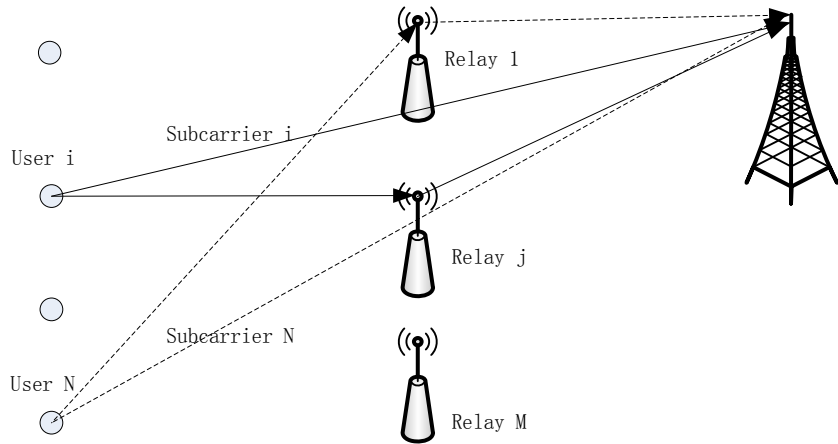


Desired research topics

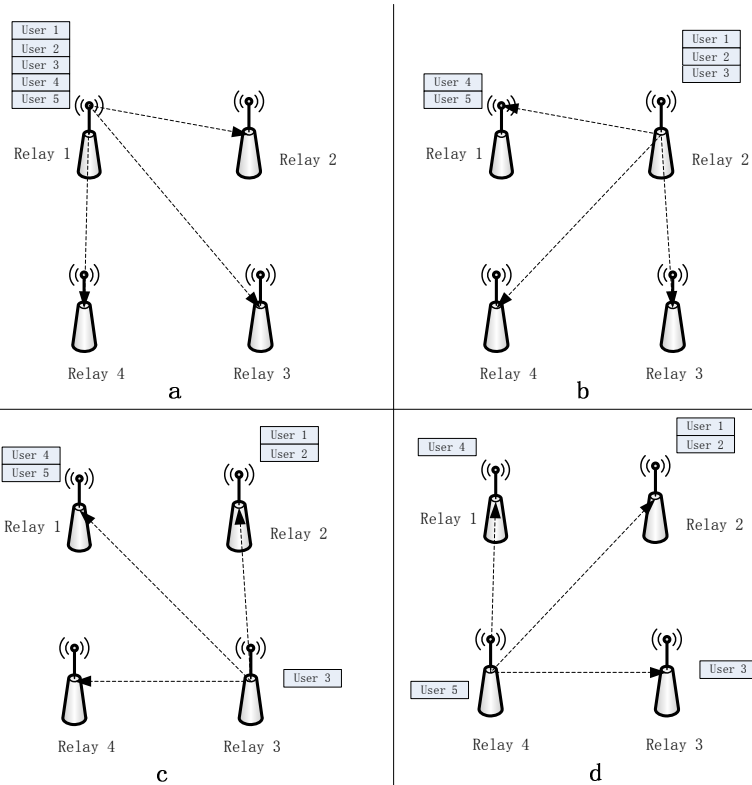
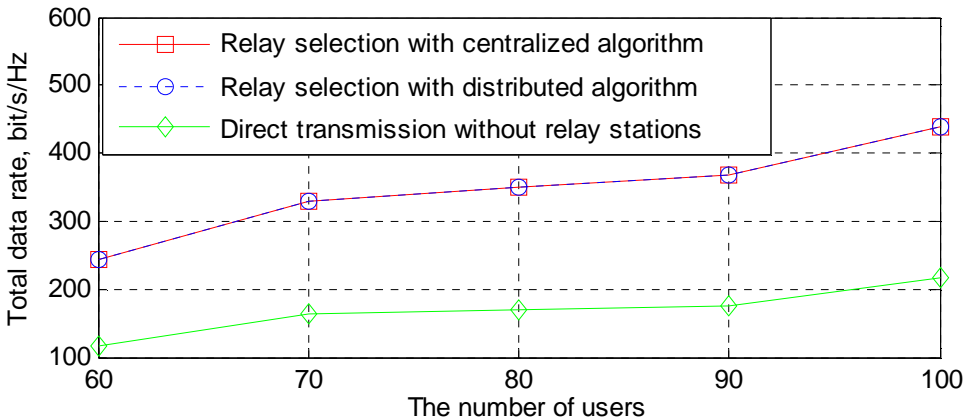
- Relay and Comp technology in wireless network
- Key technologies in CR networks
- Key technologies in self organization networks



R&D Activities for Relay technology in wireless network



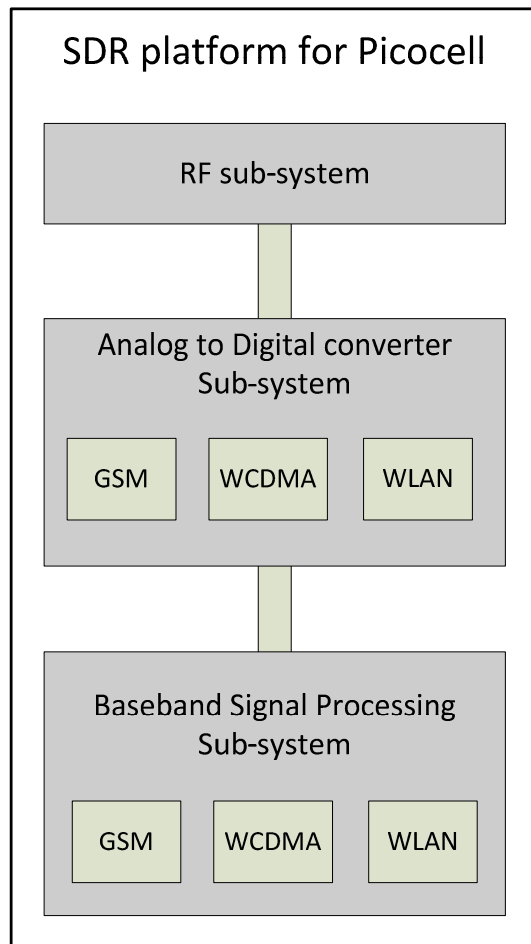
System model



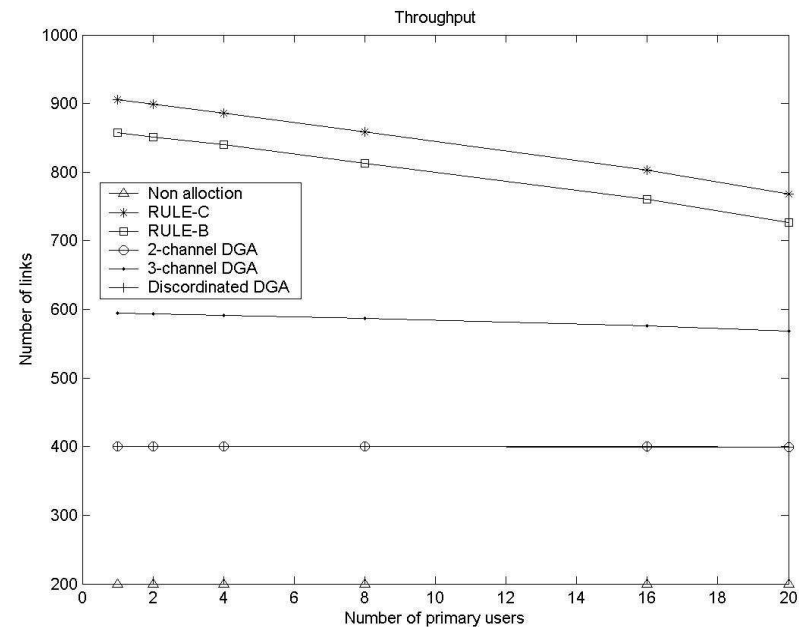
An example to illustrate the distributed algorithm.



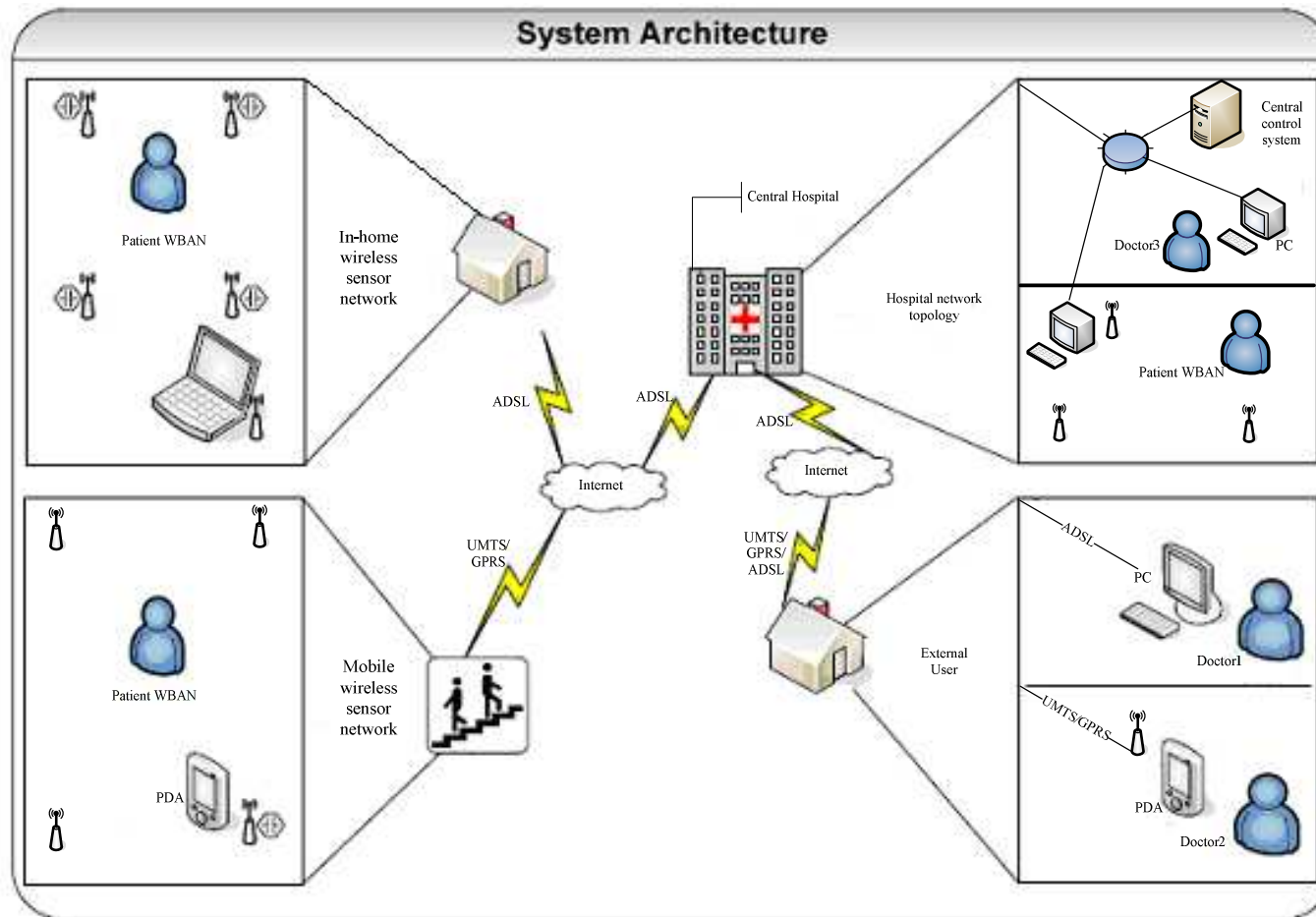
R&D Activities in CR network



- ❑ Significant Cycle Frequency Based Feature Detection
- ❑ Directed graph algorithm (DGA) for spectrum allocation in CR networks

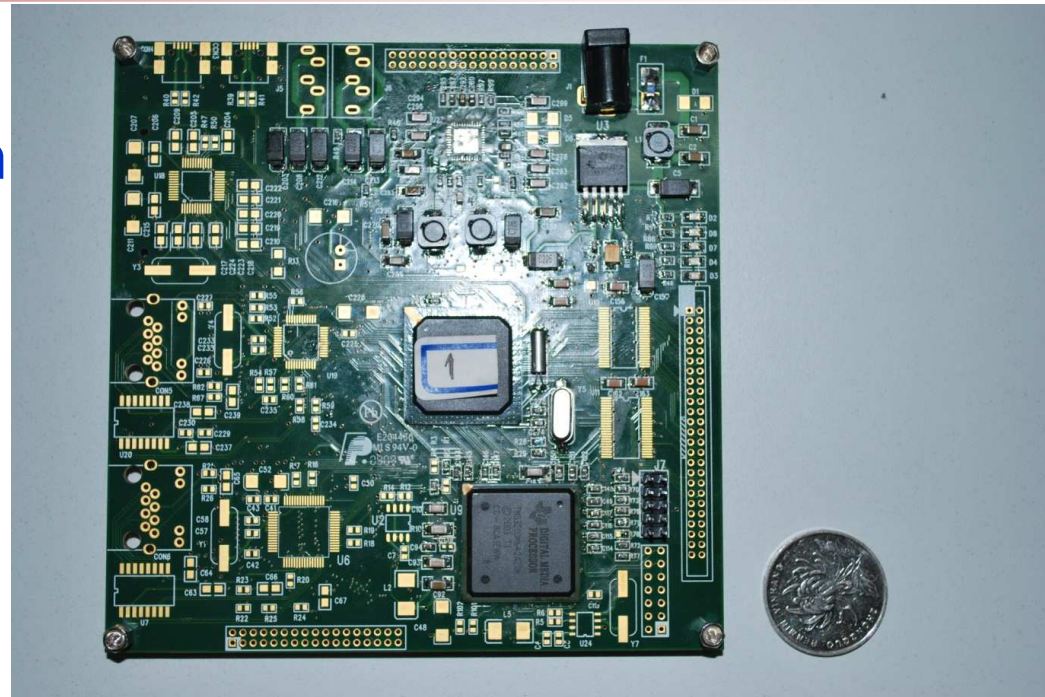


R&D Activities for Wireless Body Sensor Network



R&D Activities for Wireless Body Sensor Network

→ The radio prototype on new hardware platform



← Expected clinical verification in Shanghai Xinhua Hospital





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Thank you!



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