Joint E2RII and IEICE-TCSR Workshop

November 26, 2007
Hiroshima International University
Program

Presentations from IEICE TCSR

14:00-14:30

• “Recent Progress on SDR and Cognitive Radio in Japan - Review of Presentations in IEICE TCSR,” Jun-ichi Takada (Tokyo Tech)

14:30-15:00

Program

15:00-15:30

• “Cognitive Wireless Clouds -- Network Architecture for Cognitive Radio Technology --,”
  Homare Murakami, Goh Miyamoto, Kentaro Ishizu, Ha Nguyen Tran, Stanislav Filin, Hiroshi Harada, Shuzo Kato (NICT), Mikio Hasegawa (Tokyo University of Science), Yoshia Saito, Yoshitoshi Murata (Iwate Prefectural Univ.)

15:30-16:00

• “Routing Management for Cognitive Radio Access Network,”
  Akira Yamaguchi (ATR)

16:00-16:15

• Break
Program

Presentations from E2Rll

16:15-16:45

• “E2R Programme Achievements - Towards Cognitive Radio Systems,” Didier Bourse (Motorola)

16:45-17:15

• “E2R Flexible Spectrum Management and Cognitive Pilot Channel,” Klaus Moessner (University of Surrey)

17:15-17:45

• “E2R Reconfigurable Equipment Architecture,” Gary Clemo (Toshiba Research Europe Ltd)
Recent Progress on SDR and Cognitive Radio in Japan

Review of Presentations in IEICE TCSR

Jun-ichi Takada
Chairman, IEICE TCSR
Tokyo Institute of Technology

November 26, 2007
Joint E2RII and IEICE-TCSR Workshop
Hiroshima, Japan
Table of Contents

• Review of TCSR activities since last joint workshop
  – TCSR Meetings
  – IEICE Conferences
  – IEICE Transactions

• Recent researches in SDR and cognitive radio in Japan
IEICE TCSR

• Technical Committee on Software Radio

• Open place for technical discussion and exchange of experiences

• Publication of IEICE Technical Report

• Not a project, not a standardization body, not a consortium/forum
Coverage areas of IEICE TCSR

Components

- Wideband and multiband antennas
- Adaptive antennas and space-time signal processing
- Wideband, multiband and adaptive analog devices and circuits
- High speed and wideband ADC/DAC
- Reconfigurable logics
- Signal processing devices
Coverage areas of IEICE TCSR

Networks and Services

- Application of software radio
- Software download
- Inter-system roaming
- Global roaming
- Reconfiguration at network layer
- Security
- Compliance test and compatibility
Coverage areas of IEICE TCSR

Cognitive Radio

- Cognitive radio technology
- Signal detection and spectrum estimation
- Interference control and mitigation
- Location-based techniques
Coverage areas of IEICE TCSR

Systems and software

- Adaptive transmissions and signal processing
- Blind signal identification
- Software radio architecture
- Application Program Interface
- Software
- OS and programming languages
- IC and LSI for software radio
- Prototype of software radio
TCSR Meetings

- March 7-9 in Yokosuka Research Park
- May 24-25 in University of Electro-Communications
- July 26-27 in Yokosuka Research Park
- November 26-27 in Hiroshima International University
TCSR March meeting

- Mobile Communication Workshop
  - Sponsored by TCs on radio communication systems, wideband systems, mobile multimedia, microwave, and software radio

- 25 regular papers for SR sessions
  - 80% on cognitive radio
  - Totally 105 papers
TCSR March meeting

• Special session “Interference mitigation techniques for WPAN”
  – The latest trend of Japanese mobile communications policies toward the efficient usage of radio spectrum (Y. Nakamura, MIC)
  – Routing management in cognitive radio network (A. Yamaguchi, ATR)
  – The autonomous distributed controlled mesh network using cognitive radio link (K. Takeuchi, KDDI Lab)
  – Next-generation UWB system with detect-and-avoid technology (H. Yamaguchi, TI)
TCSR May meeting

• Joint Workshop with SDR Forum
  – The Vanu SDR cellular base station
  – Activities and Progress of the SDR Forum and IEEE 1900 (J.M. Chapin, Vanu)
  – Activity of research and development on software radio and cognitive radio in technical committee of software radio (H. Harada, NICT)
  – Sampling Rate Selection in Cognitive Radio (Y. Sanada, Keio Univ.)
  – A Framework for Modem LSI Design Based on SDR Architecture (T. Horiguchi, Toshiba)
  – Recent Advances in RF Devices for Future Wireless Systems (Y. Yamaguchi, NTT)
TCSR May meeting

• Panel discussion: “Propagation and spectrum sharing in software radio and cognitive radio”
  – Propagation modeling for interference study (J. Takada, Tokyo Tech)
  – Time-spatial propagation model for wideband mobile radio (T Fujii, Softbank Mobile)
  – Propagation standard in ITU-R and interference protection criteria (A. Sato, Tokyo Eng. Univ.)
  – Desired RF and analog device technologies required for practicable software radios (M. Taromaru, ATR)

• 11 Regular papers
TCSR Awards presented in May meeting

Best paper award

“Software Defined Radio with Reconfigurable Processor Based on ALU Array Architecture,” Makoto Ozone, Katsunori Hirase, Kazuhisa Iizuka, Hiroshi Nakajima, Tatsuo Hiramatsu (SANYO), Shinji Kimura (Waseda Univ.)

Best exhibition award

“Implementation of broadcasting receiver on our original signal processing platform for software defined radio,” Akihisa Yokoyama, Takashi Matsumura (Toyota ITC), Hiroshi Harada (NICT)
TCSR Awards presented in May meeting

Young researcher award

“Cognitive MIMO Mesh Network -- Spatial Spectrum Sharing by using MIMO Algorithm --,”
Kei Sakaguchi (Tokyo Inst. Tech.), Takeo Fujii (Univ. Electro-Communications), Fumie Ono (Tokyo Univ. Science), Kenta Umebayashi (Tokyo Univ. Agriculture and Tech.)
TCSR July meeting

• Software & Cognitive Radio Technical Expo

• 17 booths for technical exhibition
  – Cognitive radio / network prototypes
  – Software radio products, testbed and applications
  – RF and signal processing

• 11 regular papers

• 7 booths for product exhibition
  – Software, boards, instruments
TCSR July meeting

• Tutorial “Toward single-chip realization of software radio”
  – A survey on reconfigurable RF circuits technology (K. Okada, Tokyo Tech)
  – Trend and challenges for DSP implementation of smart antenna and adaptive signal processing (J. Fujiwara, ArrayComm)
TCSR November meeting

- Joint workshop with E2RII
  - 7 invited papers (4 from TCSR, 3 from E2RII)
- 10 regular papers
- 7 poster papers
  - For individual and extensive discussions
- 3 special talks
  - Reports of conferences and standard activities
Sessions organized by TCSR

- IEICE General Conference on March 20-23 in Meijo University (Nagoya)
- IEICE Communication Society Conference on September 10-14 in Tottori University
- Microwave Workshop and Exhibitions on November 28-30 in Pacifico Yokohama
IEICE General Conference in March

- Panel discussion “How to acquire or reserve the spectrum for next generation wireless systems”
  - Frequency allocation for next generation wireless systems (K. Sato, ARIB)
  - Technologies for efficient spectrum usage for next generation wireless systems (H. Yoshino, NTT DoCoMo)
  - Improvement of spectrum efficiency – spatial and temporal multiplexing (T. Fujii, Softbank Mobile)
  - Underlay technology – UWB (T. Ikegami, Meiji U)
  - Interference avoidance – cognitive radio (T. Fujii, UEC)
IEICE General Conference in March

- 35 regular papers
  - 30 papers on cognitive radio
IEICE Society Conference in September

• Panel discussion “Coexistence of cognitive radio with existing radio services”
  - Introduction – cognitive radio for spectrum sharing (S. Sampei, Osaka Univ)
  - Radio regulation issues on cognitive radio (K. Yuuguchi, Sagami Women's Univ.)
  - Spectrum sensing technology in cognitive radio (S. Sasaki, Niigata Univ)
  - Spectrum sharing: trend in Europe and an efficient sharing technology (H. Yomo, Aalborg Univ)
  - R&D on cognitive radio – an industrial perspective (T. Kobayashi, Toshiba)
IEICE Society Conference in September

- 36 regular papers
  - 31 papers on cognitive radio
Microwave Workshops and Exhibition

• Sponsored by IEICE
• Workshop “Spectrum Sharing with Cognitive Radio”
  – Technology trends and challenges of dynamic spectrum access (T. Fujii, UEC)
  – Sharing study in ITU-R; a view from radiowave propagation (A. Sato, TEU)
  – Interference and DAA Issues in UWB Systems (B. Zhen, NICT)
  – Standardization of cognitive radio technology in IEEE 802.22 (S. Sasaki, Niigata Univ)
IEICE Transactions

- IEICE Transactions on Communications “Special Section on Cognitive Radio and Spectrum Sharing Technology”
  - To be published in January 2008
  - About 50 submissions

- IEICE Transactions on Communications (Japanese edition) “Special Issue on Cognitive Radio Technology toward Ubiquitous Society”
  - To be published in November 2008
  - Deadline: March 5, 2008
Number of presentation : Top 10

- NICT 34 (19.2%)
  - Cognitive SDR terminal
  - Cognitive wireless clouds
- KDDI Labs 20 (11.3%)
  - Inter-basestations autonomous cognitive network
- ATR 12 (6.8%)
  - Routing in cognitive multi-system network
- NTT 11 (6.2%)
  - Autonomous adaptive base station
  - RF subsystems
- Hitachi 9 (5.1%)
  - Cognitive radio resource management
Number of presentation : Top 10

- Tokyo Tech 8 (4.5%)
  - Interference and sensing issues
  - MIMO-SDR testbed and applications
- Keio Univ 8 (4.5%)
  - A/D conversion and signal processing
- Toshiba 8 (4.5%)
  - Dynamic spectral access
  - SDR developing platform with behavior synthesis
- Mitsubishi 8 (4.5%)
  - Multi-system parallel transmission
- NTT DoCoMo 7 (4.0%)
  - ITU-R issues, RF components, signal processing
Ideal balance among different industries
Technological Strategies Focusing on Enhancement of ICT International Competitiveness (MIC)

Most important subjects selected for FY 2008

● Next-generation network

● Wireless communications
  – Cognitive wireless technology
  – Terminal platforms

● Digital broadcasting

● Other fields

Plan in 2008-2009

Forthcoming TCSR Meetings

• January 24 - 25 in Ohmachi, Nagano
  – Evening session:
  – Panel discussion:

• March 5 - 7 in YRP
  – Mobile communications workshop

• May 29 - 30 in Yokohama National University
  – Joint SDR Forum and TCSR workshop
Plan in 2008-2009

Forthcoming TCSR Meetings

- July 31 – August 1 in NICT, Koganei, Tokyo
  - Technical Expo
  - In series with IEEE SCC41 meeting
- October 22 - 24 in Okinawa
  - Workshop on distributed wireless network
- January 22 – 23, 2009 in Kyoto University
  - Joint E3 and TCSR Workshop