

# Overview of NCEL: Network Communications & Economics Lab

**Prof. Jianwei Huang (黄建伟)**

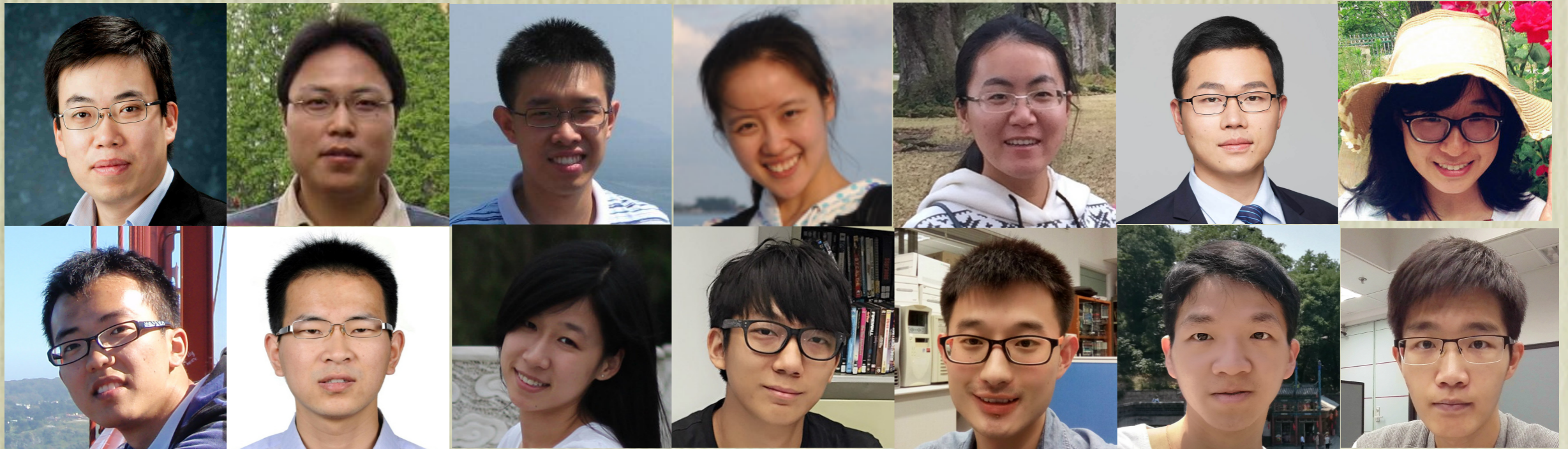
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School of Science and Engineering,  
The Chinese University of Hong Kong, Shenzhen

Department of Information Engineering,  
The Chinese University of Hong Kong



# NCEL History

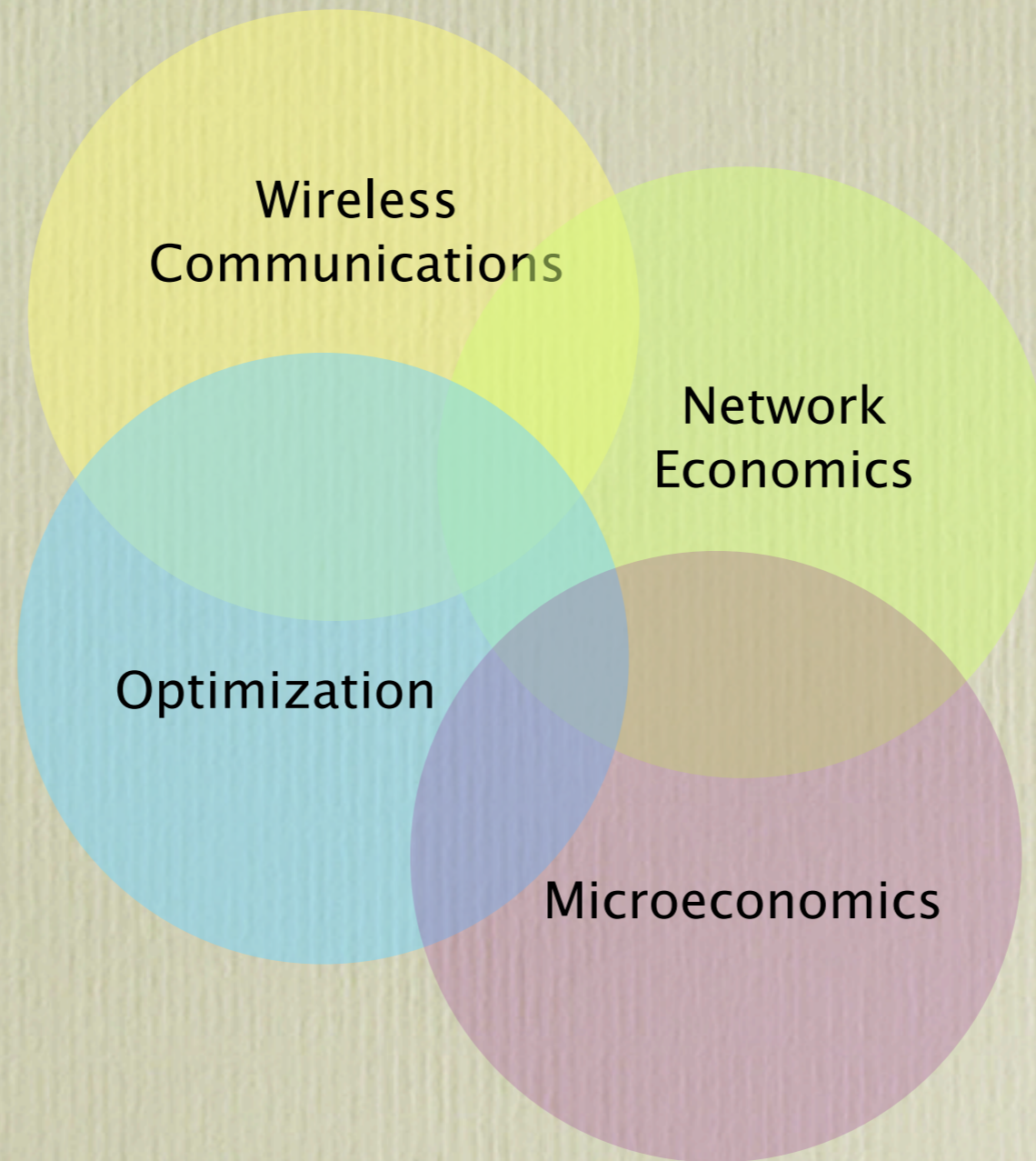


- Established in 2007 in CUHK Hong Kong
- 2007-2018: Graduated 12 PhDs, 3 Masters, and 7 Postdocs
- Current: 2 professors, 8 PhD students, and 1 Postdoc
- 2019: expanding to CUHK Shenzhen

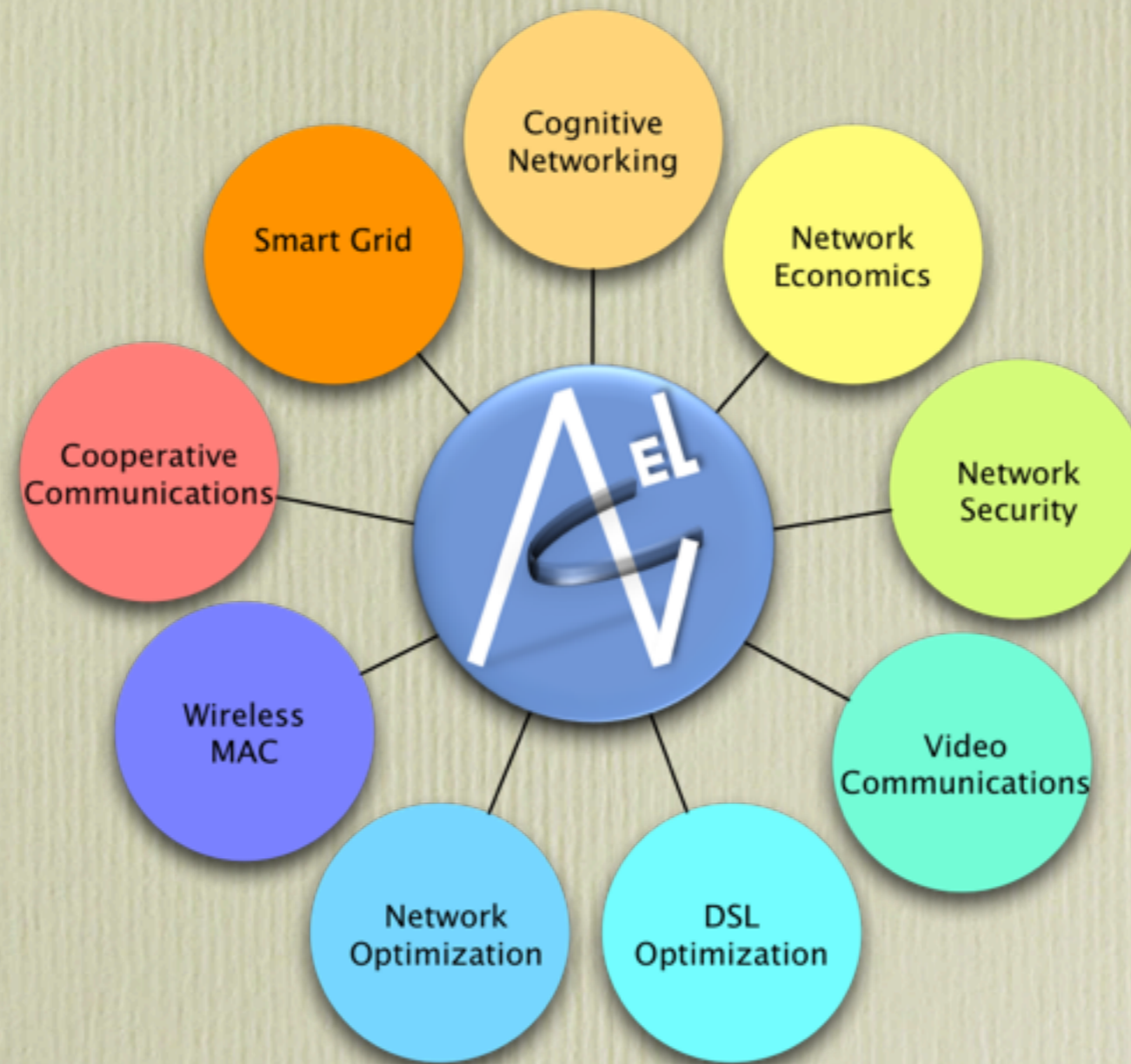
# NCEL Vision

- Conduct **world-class high-impact theoretical research** in the interdisciplinary area among **communications, networking, and economics**.
- Help members grow into **international leading researchers**.

# Research Themes



# Research Areas



<http://ncel.ie.cuhk.edu.hk/current-research>

# Research Collaborations

- Universities: North America & Europe



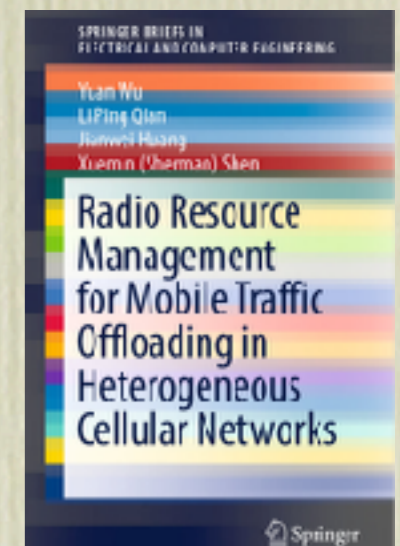
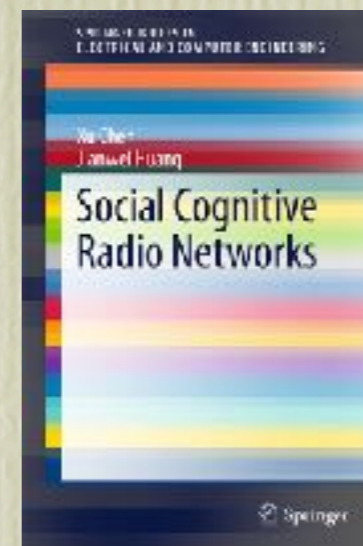
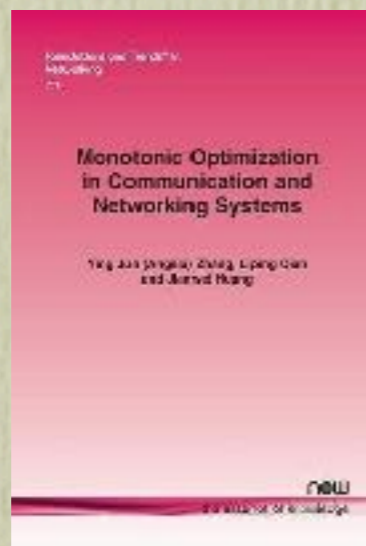
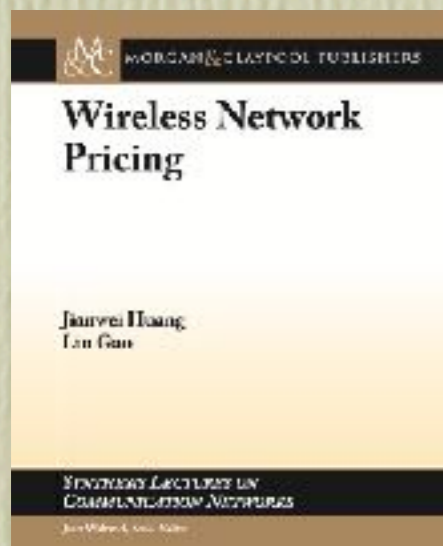
- Universities: Asia-Pacific



- Industry partners



# NCEL Books



<http://ncel.ie.cuhk.edu.hk/content/books>

# NCEL Tutorials



**How Do We Play Games?**



**Wireless Network Economics and Games**



**Mobile Data Offloading**



**User-Provided Networks**



**Economics of TV White Space Networks**



**Fog Computing and Networking**

<http://ncel.ie.cuhk.edu.hk/content/tutorials>



# NCEI Director: Prof. Jianwei Huang

- Presidential Chair Professor and Associate Dean, CUHK, Shenzhen
- IEEE Fellow, Class of 2016 (at the age of 37)
- Thomson Reuters Highly Cited Researcher, 2016/2017
- IEEE ComSoc Distinguished Lecturer 2015-2018
- CUHK Young Researcher Award, 2014
- IEEE ComSoc Asia-Pacific Outstanding Young Researcher Award 2009
- IEEE Marconi Award in Wireless Communications 2011
- Eight International Conference Best Paper Awards
- Editor of IEEE Journal on Selected Areas in Communications, Transactions on Networking, Transactions on Mobile Computing, Transactions on Wireless Communications, Transactions on Network Science and Engineering, Transactions on Cognitive Communications and Networking
- Total Google Citations: 10200, H-Index: 50

# NCEL Faculty Alumni

- Liqun Fu (PhD 2011): Xiamen University (Distinguished Professor)
- Xu Chen (PhD 2012): Sun Yat-Shen University (Full Professor)
- Lingjie Duan (PhD 2012): Singapore University of Technology & Design (Assistant Professor)
- Changkun Jiang (PhD 2017): Shenzhen University (Assistant Professor)
- Fen Hou (Postdoc 2011): University of Macau (Assistant Professor)
- Lin Gao (Postdoc 2016): Harbin Institute of Technology - Shenzhen (Associate Professor)
- Quansheng Guan (Postdoc 2013): South China University of Technology (Full Professor)
- Yanru Zhang (Postdoc 2017): University of Electronic Science and Technology of China (Full Professor)

# NCEL Member Achievements (1/2)

- Chinese Thousand Talents Award for Young Professionals (青年千人)
  - Liqun Fu (2015) and Xu Chen (2016)
- IEEE ComSoc Asia-Pacific Outstanding Young Researcher Award
  - Lingjie Duan (2015), Lin Gao (2016), Xu Chen (2017)
- Hong Kong Young Scientist Awards
  - Xu Chen: Physical/Mathematical Science Runner-up (2014)
  - Lingjie Duan: Engineering Science Finalist (2014)

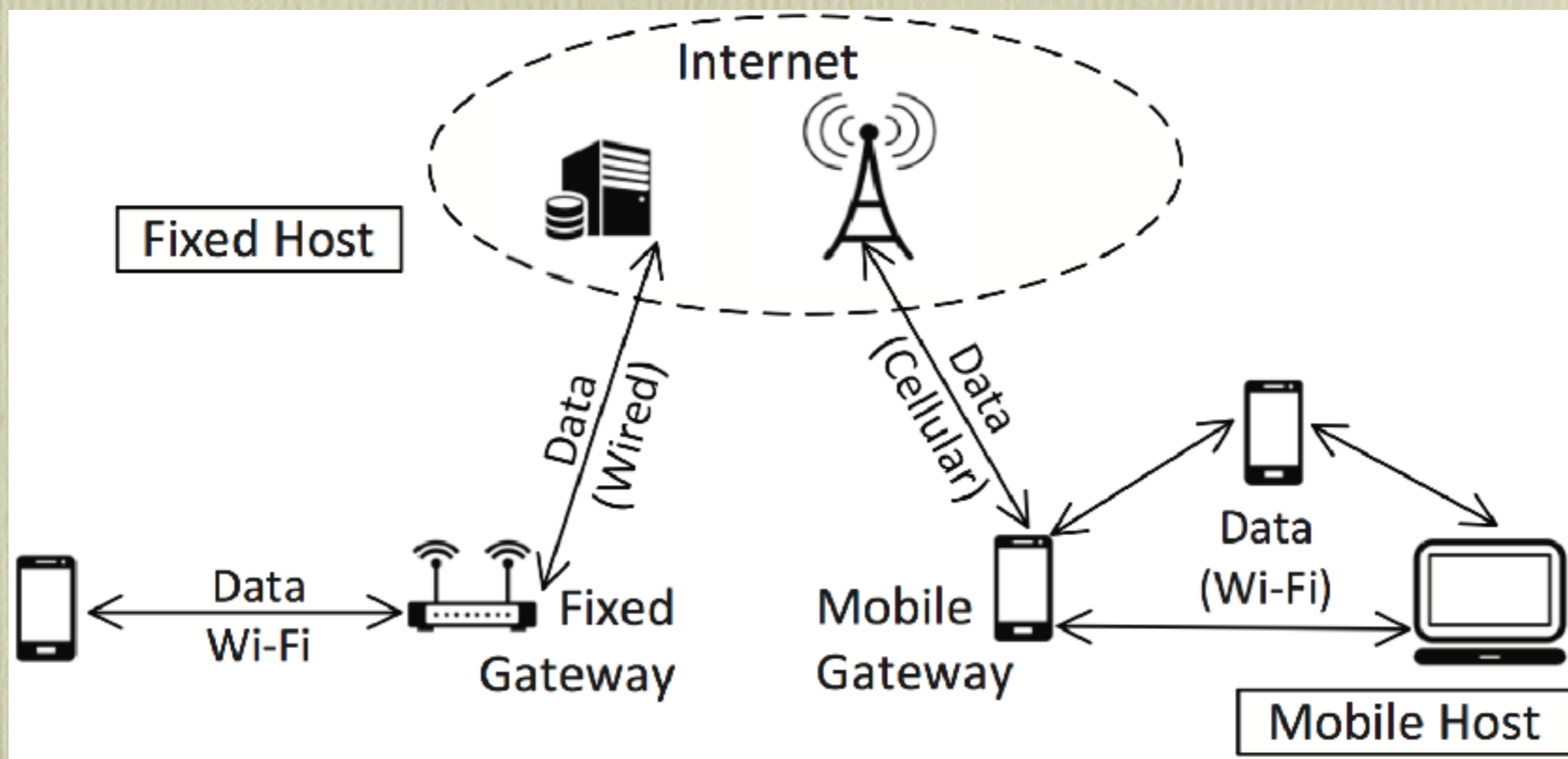
# NCEL Member Achievements (2/2)

- CUHK Postgraduate Research Output Award: Yuan Luo (2015)
- CUHK Young Scholar Thesis Award: Yuan Luo (2015)
- Phd Students Visiting Top Universities for 6-9 months
  - Princeton University: Liqun Fu (2010), Meng Zhang (2018)
  - University of California, Berkeley: Lingjie Duan (2011), Yuan Luo (2014)
  - University of Illinois Urbana-Champaign: Qian Ma (2015)
  - Yale University: Haoran Yu (2015), Zhiyuan Wang (2019)
  - Stanford University: Ming Tang (2017)

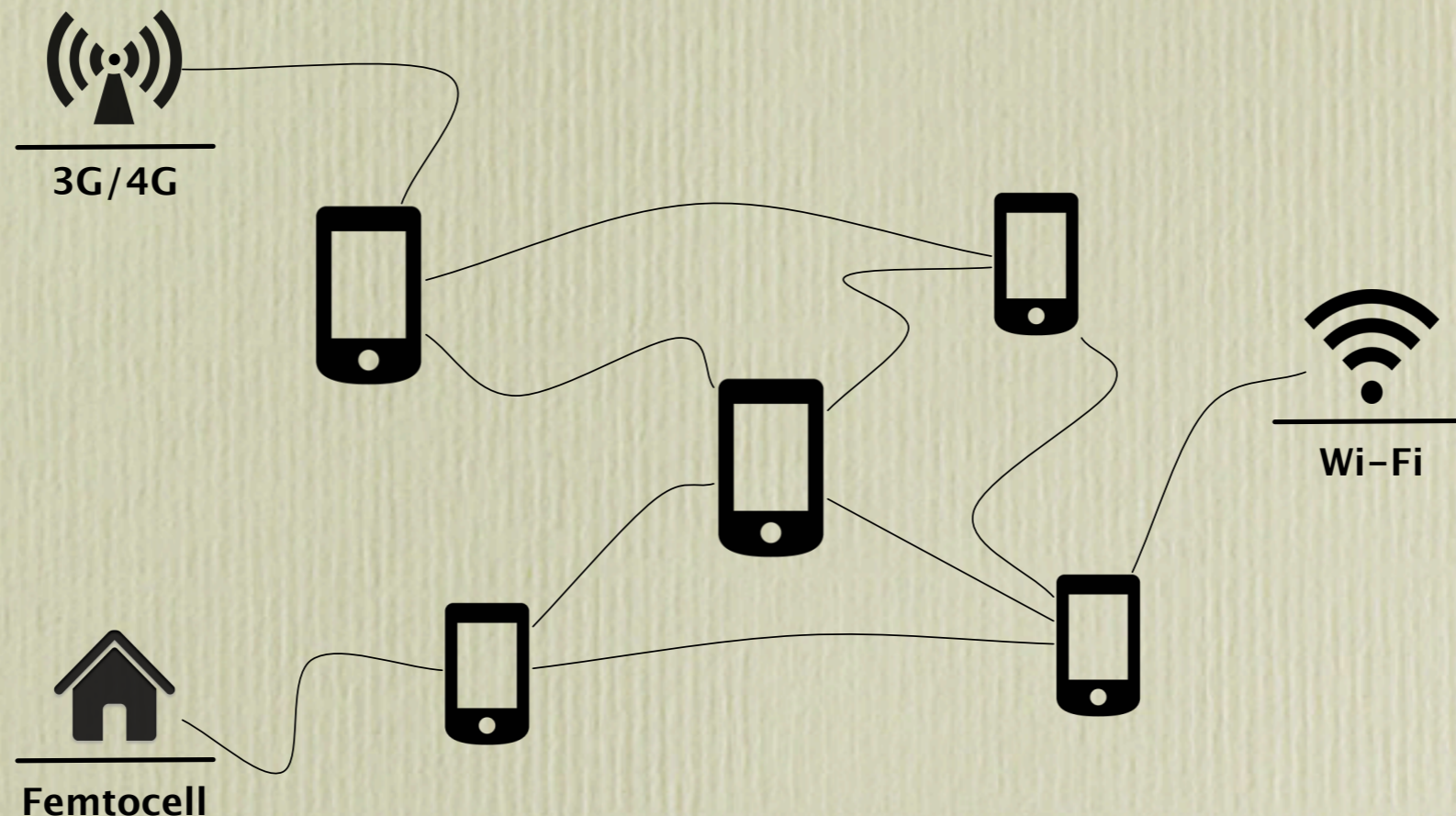
# Selected Research Highlights

More Details at <http://ncel.ie.cuhk.edu.hk/current-research>

# Area I: User Provided Networking

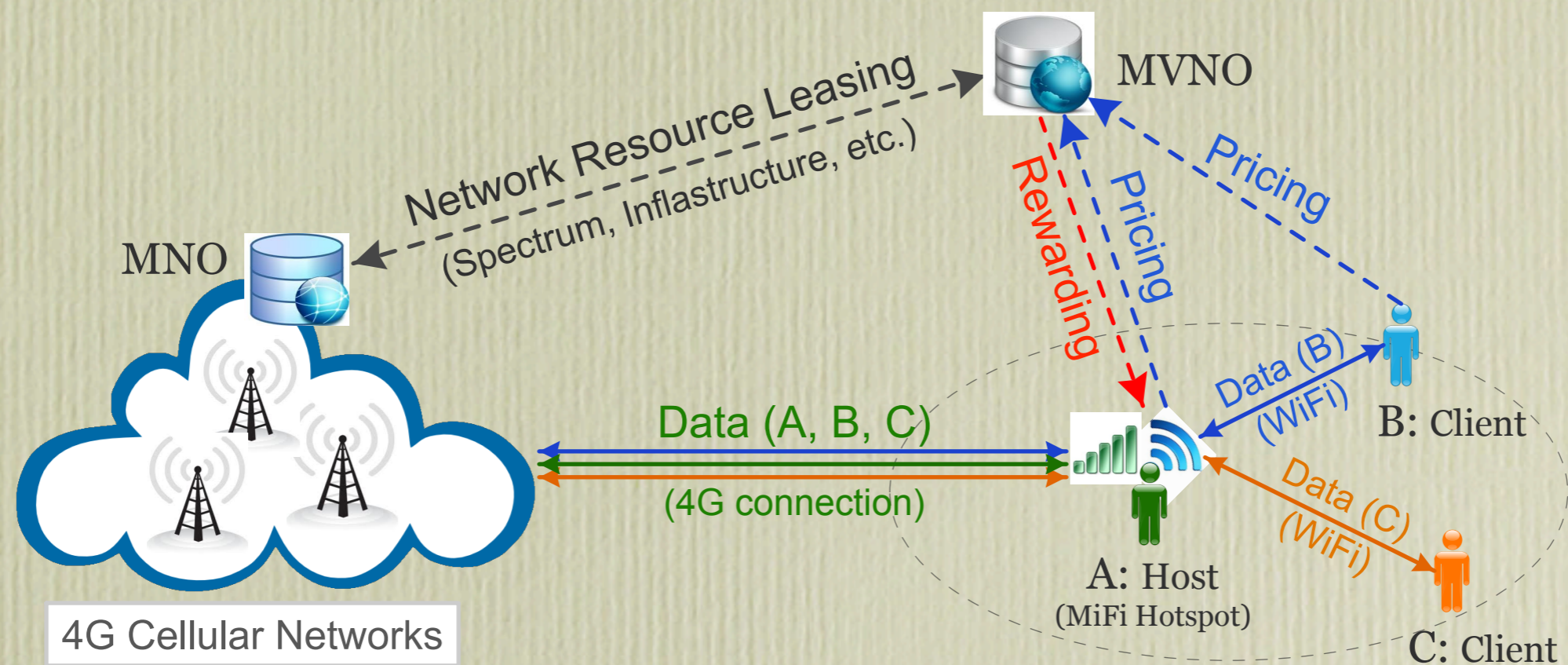


# Crowd-Sourced Internet Connectivity



- G. Iosifidis, L. Gao, J. Huang, and L. Tassiulas, “Enabling Crowd-Sourced Mobile Internet Access,” *IEEE INFOCOM*, 2014

# Hybrid Pricing-Reward Scheme



- L. Gao, G. Iosifidis, J. Huang, and L. Tassiulas, "Hybrid Data Pricing for Network-Assisted User-Provided Connectivity," *IEEE INFOCOM*, 2014



# Area II: Dynamic Spectrum Sharing

## UNITED STATES FREQUENCY ALLOCATIONS THE RADIO SPECTRUM

**RADIO SERVICES COLOR LEGEND**

ACRONYMAL MOBILE	MOBILE SATELLITE	SPACE RESEARCH
ACRONYMAL MOBILE SATELLITE	LAND MOBILE	NONCOMMERCIAL SATELLITE
ACRONYMAL NONNAVIGATION	LAND MOBILE SATELLITE	NONCOMMERCIAL
NAVY	WARTIME MOBILE	NONCOMMERCIAL SATELLITE
NAVY SATELLITE	WARTIME MOBILE SATELLITE	NONNAVIGATION
BROADCASTING	WARTIME NONNAVIGATION	NONCOMMERCIAL SATELLITE
BROADCASTING SATELLITE	METEOROLOGICAL AID	SPACE RESEARCH
DATA EXPLORATION SATELLITE	METEOROLOGICAL SATELLITE	SPACE RESEARCH
FIXED	MOBILE	STANDARD FREQUENCY AND TIME SIGNAL
FIXED SATELLITE	MOBILE SATELLITE	STANDARD FREQUENCY AND TIME SIGNAL SATELLITE

**ACTIVITY CODE**

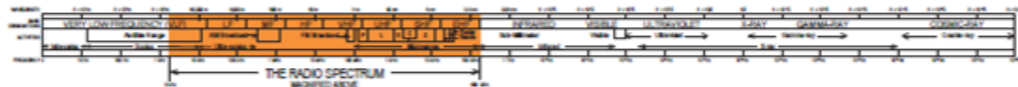
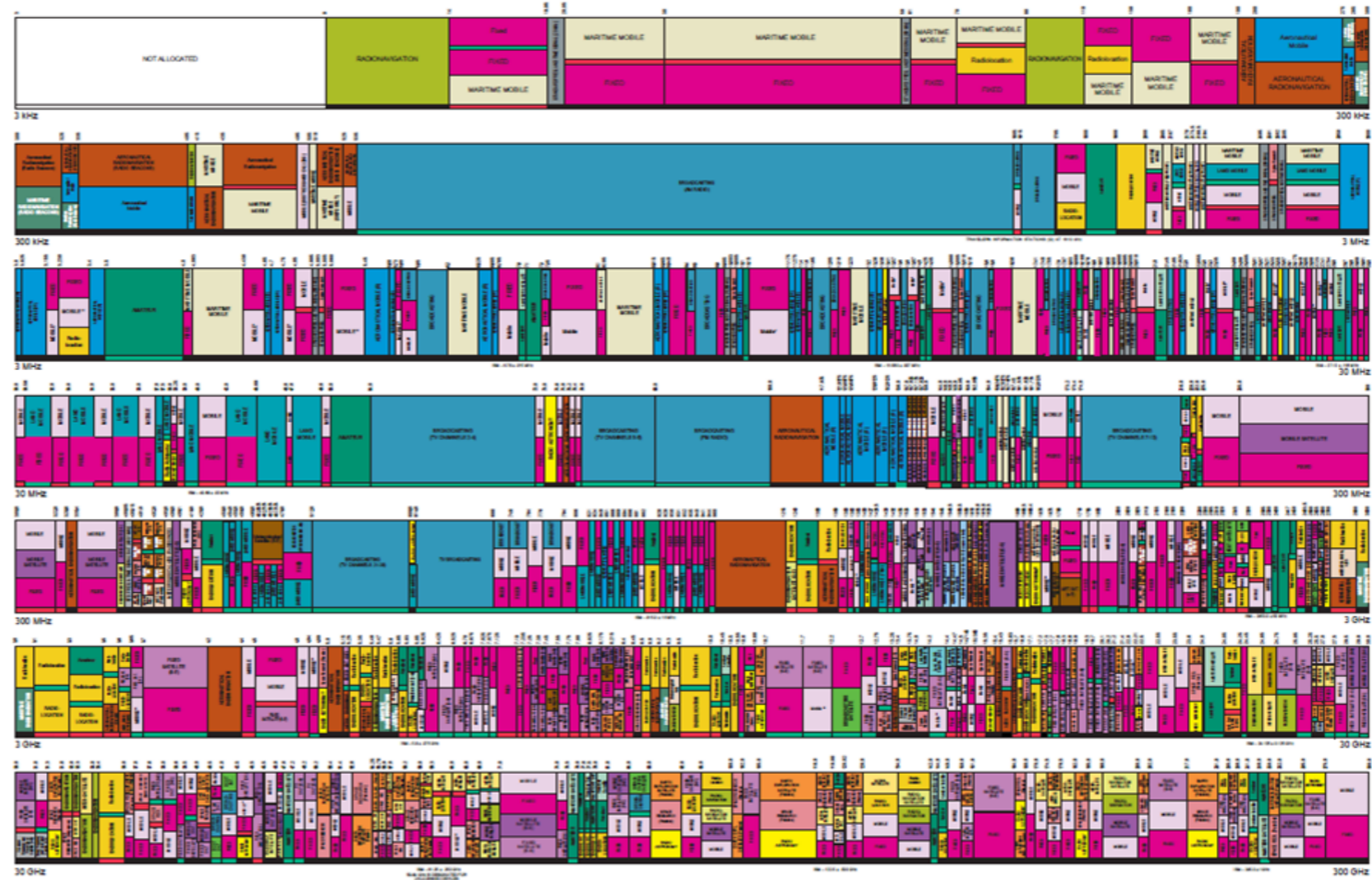
EXPERIMENTAL	NONCOMMERCIAL/ENVIRONMENT BASED
NONEXPERIMENTAL	

**ALLOCATION USAGE DESIGNATION**

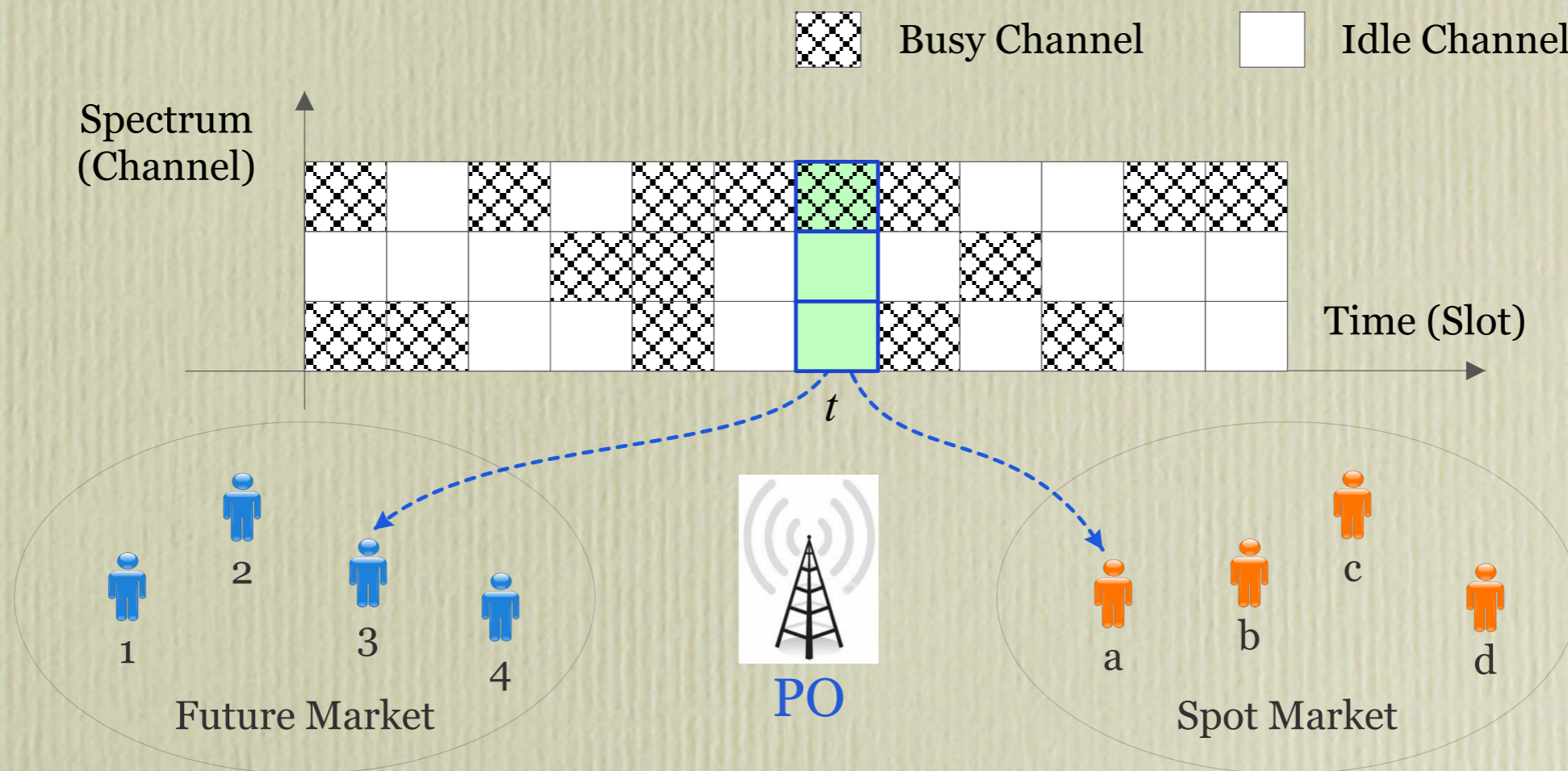
SERVICE	EXAMPLE	DESCRIPTION
Primary	FIXED	Capital letters
Secondary	Mobile	1st Capital with lower case letters

This chart is a general guide and does not constitute a license. It is intended to be used in conjunction with the Federal Communications Commission's (FCC) rules and regulations. For more information on the radio spectrum, visit the FCC's website at [www.fcc.gov](http://www.fcc.gov).

**U.S. DEPARTMENT OF COMMERCE**  
National Telecommunications and Information Administration  
Office of Spectrum Management  
October 2003

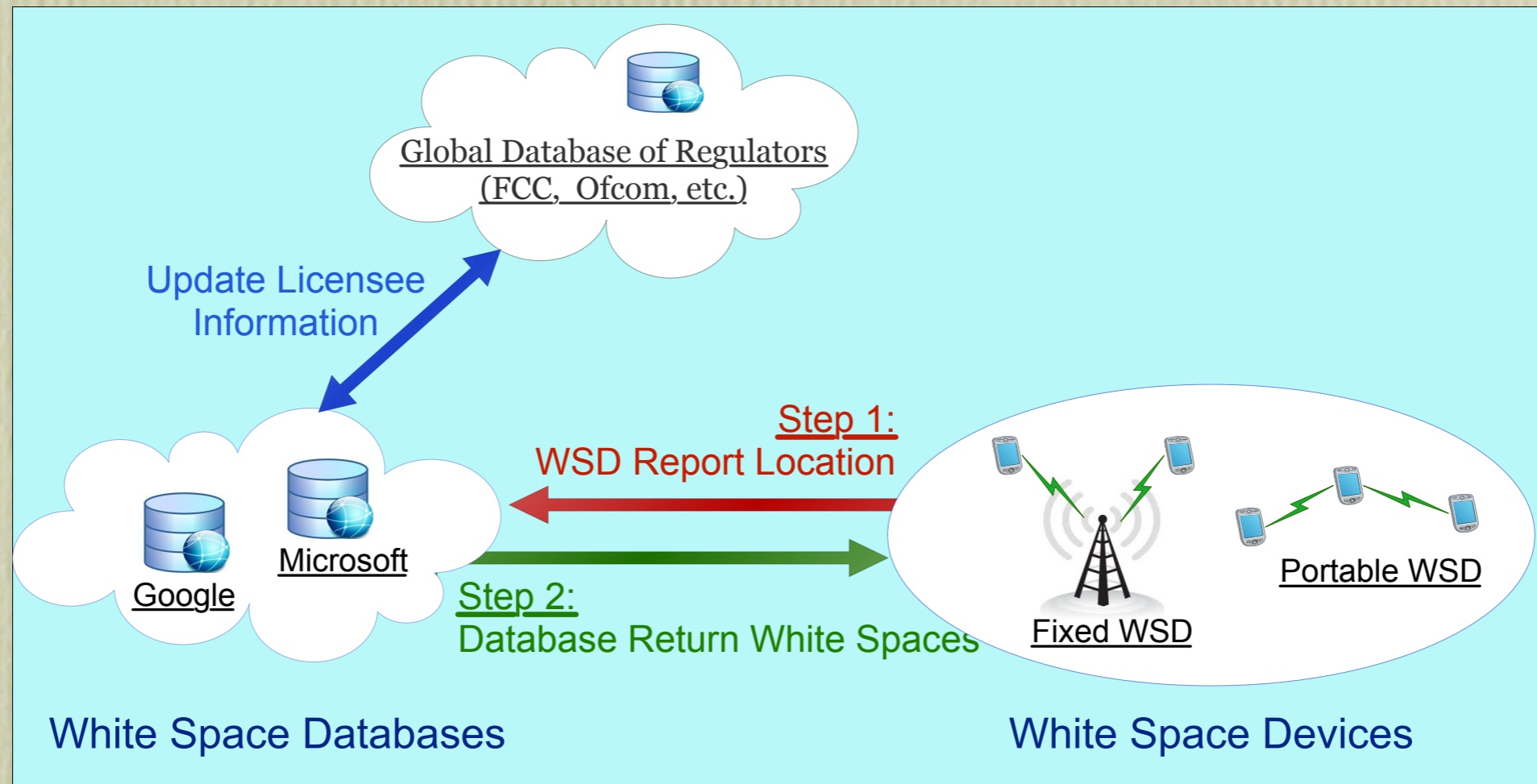


# Hybrid Spectrum Markets



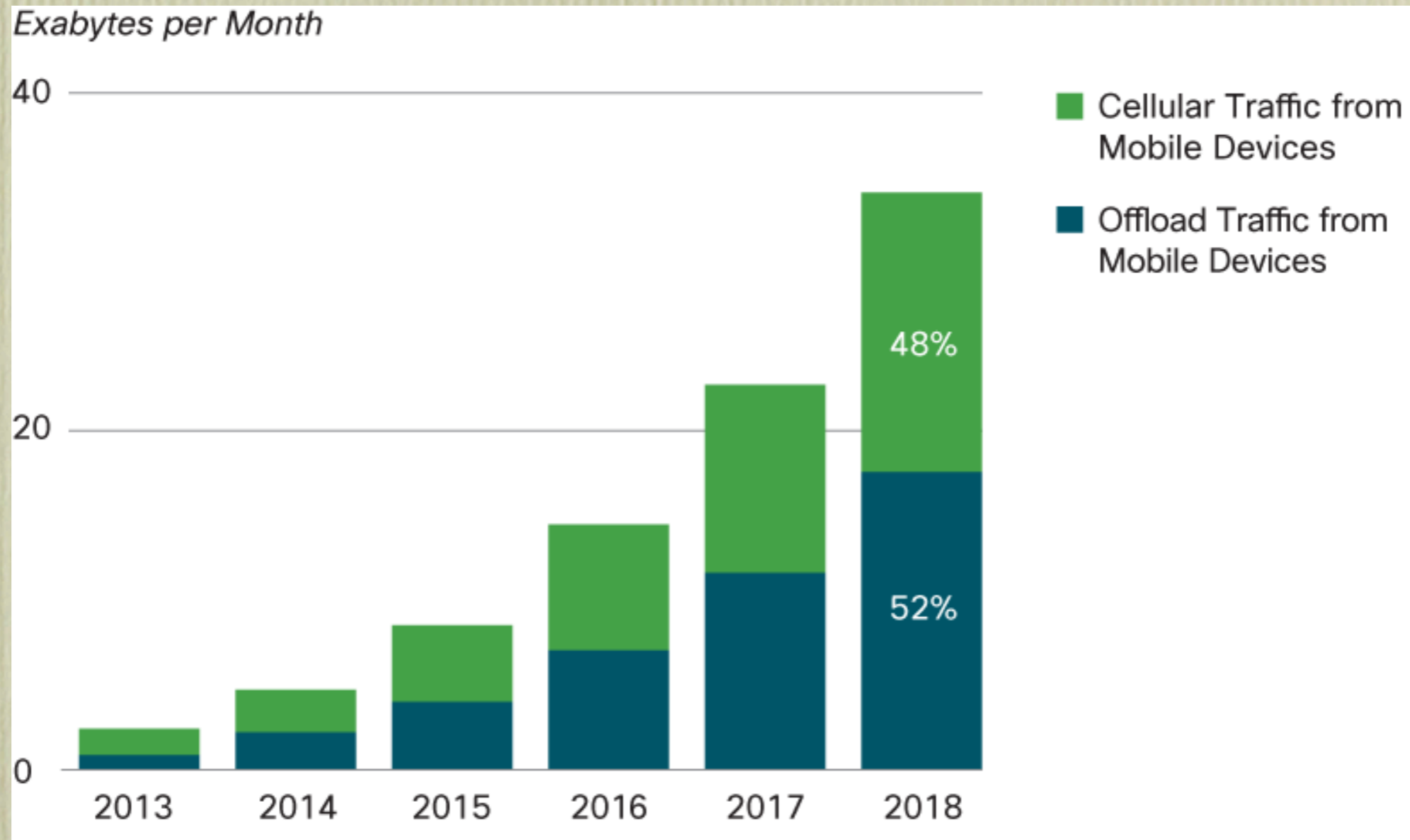
- L. Gao, J. Huang, Y.J. Chen, and B. Shou, "An Integrated Contract and Auction Design for Secondary Spectrum Sharing," *IEEE Journal on Selected Areas in Communications*, 2013

# Spectrum Information Market

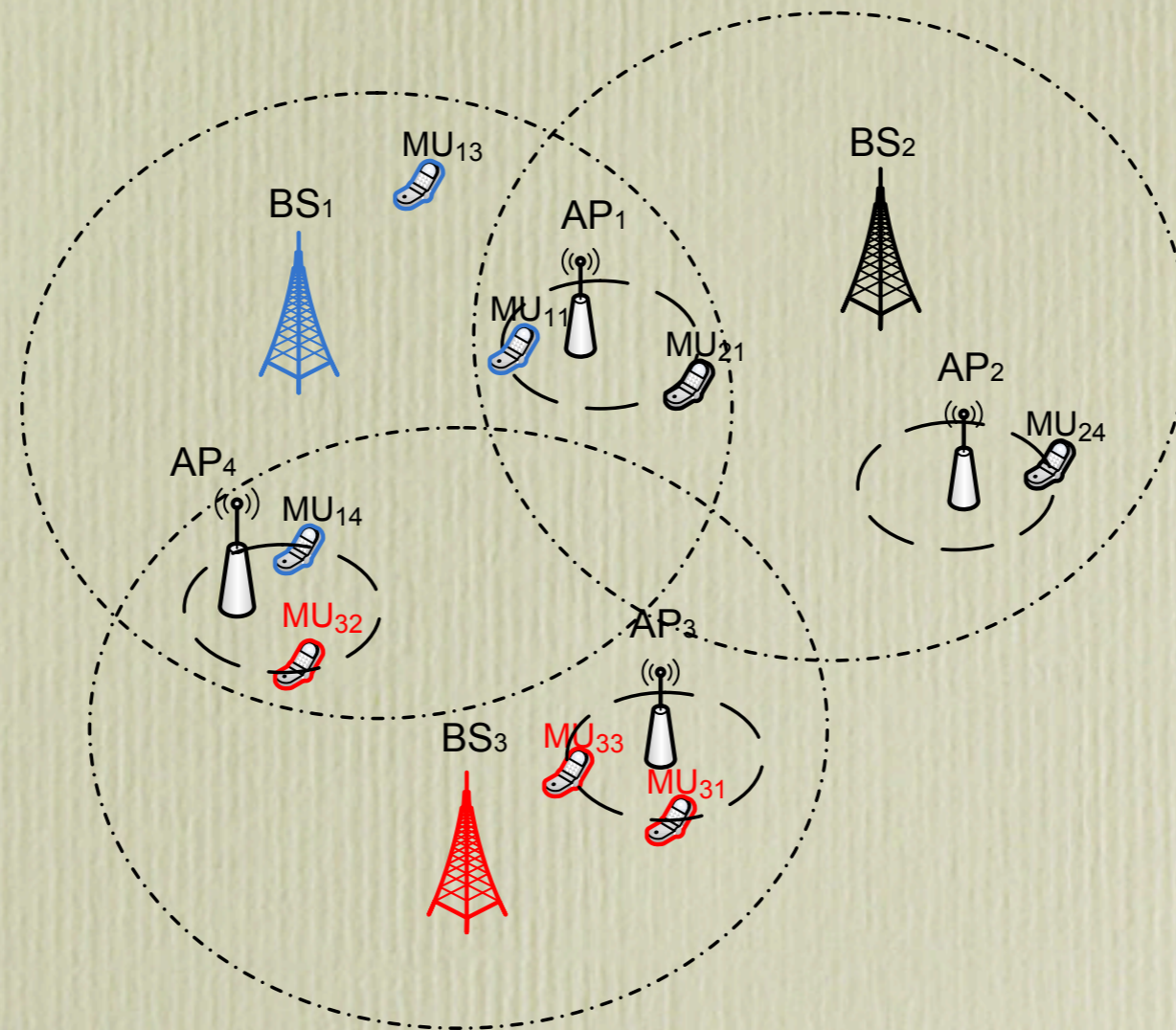


- Y. Luo, L. Gao, and J. Huang, "Trade Information, Not Spectrum: A Novel TV White Space Information Market Model," *IEEE WiOpt* (**Best Paper Award**), 2014

# Area III: Mobile Data Offloading



# Data Offloading Market



- G. Iosifidis, L. Gao, J. Huang, and L. Tassiulas, “A Double Auction Mechanism for Mobile Data Offloading Markets,” *IEEE Transaction on Networking*, accepted July 2014 (conference version received *IEEE WiOpt Best Paper Award*, 2013)

# NCEL Welcomes You

- Highly motivated **PhD students** with passion in interdisciplinary network economics research
  - Check <http://www2.cuhk.edu.hk/gss/hkphd/>
- **Postdoc researchers** with a strong publication record and a strong desire to succeed in academia
- **Visiting PhD students** with strong publications and fresh ideas

Google “Jianwei Huang”

[NCEL.ie.cuhk.edu.hk](http://NCEL.ie.cuhk.edu.hk)

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