ICN Panel: Internet at Crossroads!

- bandwidth
- speed
- protocols (IPv6, new TCP ?)
- scalability
- autoconfiguration
- Access, availability
- Energy / green internet
- New Internet ( IoT, ...)
• **Guest panelists:**

Benoit Escrig, Université de Toulouse, France  
Mingmei Li, KDDI R&D Labs., Japan  
Fanilo Harivelolo, Université de la Réunion, France  
Katsuhiro Naito, Mie University, Japan
Mobile Data Collection - Applications & Technologies

ICN 2012 Panel
Mingmei Li, Kazuyuki Tasaka, Kiyohito Yoshihara
KDDI R&D Labs., Japan
Mobile Data Collection - Applications

Personal Data
(smart-phone, tablet user)

- Smartphone application / network log
- Health, breath record, sports data,
- Tracking, location based services
  GPS, wifi,
- Purchasing data, barcode scanning, environment data, air Pollution

Data Center
- Market/commercial
- Contents recommendation
  (Amazon, Yahoo, Facebook, ISP,)
- Hospital / Health Center
  - Healthy monitoring, management, consulting, supporting
  Google, Microsoft, KDDI, docomo, etc, )
Mobile Data Collection - Technologies

Challenges & status

End-user
(smart-phone, tablet user)

Anonymous collection personal information security/privacy

User context information collection (e.g., camera, RFIF, GPS, wifi, phone built-in sensors (KDDI labs.) energy/memory constraint

Data center
(Platform)

Cloud computing
Virtualization

Business Modeling (automatically)

Prediction possibility

Robust (adaptively to other field)

Effectiveness (low cost)
Mobile Data Collection - Technologies

Our proposal obtain Location Data with High Accuracy (Indoor environments)

To obtain location data with high accuracy, we use reference information from phone built-in sensors.

- Our result: location data can be obtained with less error, about 20%-40%, with less reference landmarks in indoor environment.
- Effects: supports a mother find her children in a shopping more accurately.

e.g. HTC Touch Diamond’s built in accelerometer, with .NET CF 2.0, allows user to know steps, distance, etc.
Cooperative communication and Seamless mobility at Crossroads

Katsuhiro Naito
Mie University, Japan
March 3, 2012
Communication at Crossroads

Tough communication is required

- High packet delivery ratio
- Short transmission delay
- High scalability

Physical layer performance is important to improve these requirements

OFDM based cooperative communication has good benefit at Crossroads
Neighborhood vehicles forward the same OFDM signal simultaneously

OFDM (Orthogonal Frequency Division Multiplexing) based cooperative communication scheme

- Neighbor vehicles forward the same OFDM signal simultaneously.
- V2 & V3 select the same random backoff period.
- V4 demodulates the data from two OFDM signals.

Graphs showing:
- Area Delivery Ratio vs. Number of vehicles
- Packet error ratio vs. Number of vehicles
- End to end delay vs. Number of vehicles

Legend:
- Proposed
- Flooding with P=100%
- Flooding with P=75%
- Flooding with P=50%

Diagram illustrating the communication process with OFDM signals.
Seamless mobility at Crossroads

Vehicles switch access networks such as 3G, WiMAX, WiFi etc.

- IP address change causes connection breaks
- Seamless communication between IPv4 and IPv6 is difficult

NTMobile (Network Traversal with Mobility)
NTMobile network

Vehicles can achieve continuous communication by using virtual an IP address over IPv4 & IPv6 networks.
Thank you for your attention!
Cooperative Communications: Challenges for Practical Implementations

Benoît ESCRIG
IRIT Laboratory
Université de Toulouse
Toulouse, France

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Cooperative Communications at the PHY Layer

**Gains:**
- Increased SNR at the receiver
- Distributed MIMO

**Transmission schemes:**
- Amplify-and-Forward
- Decode-and-Forward

**Options:**
- One or several relays
- Channel and/or space-time coding

**Issues:**
- Information Theory Issues (optimizing the Diversity/Capacity Tradeoff)

**Open Issues:**
- Mobile relays, mesh and ad hoc networks
- Joint PHY-MAC Design of Cooperative Protocols

SNR: Signal to Noise Ratio
MIMO: Multiple Input Multiple Output
Cooperative Communications at the MAC Layer

Allocating relays to a direct transmission:
collection of CSI, selection, notification of the result

Network Issues: network performance, power control, rate adaptation, fairness, interoperability

CSI: Channel State Information
Conclusion

Fixed Relays: MIMO Issues
Mobile Relays: Open Issues

Open Issues: Interactions between cooperative techniques and other optimization issues
Thank you!

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