Industry perspectives: What they need, research-wise and code-wise

November 13, 2013
4th NDN Project Retreat
Eiichi Muramoto/ Panasonic
muramoto.eiichi@jp.panasonic.com
Content

- Who we are (Panasonic)
- What we did (L4)
- What we need
  - research-wise and code-wise
  - Crowed sensing
Panasonic is

- Panasonic (Maker with 300,000 employee)
  - Home appliance maker
    - TV, Camera, Smartphone, Refrigerator, Microwave, Air-con, Home bakery, Hair drier, Shaver, Car navigation, Laptop, home power-plugs
  - System solutions
    - AV system, Security Camera
    - Fax, Copy, white board

ProAV  PA  Security Camera  Appliances (under HEMS)
Network Engineer of Panasonic R&D

We are L4 engineers for conferencing (real-time, low delay) of Panasonic R&D

TV conferencing

Bandwidth Estimation
## Hi-Accuracy bandwidth tracing

<table>
<thead>
<tr>
<th>TX Bandwidth</th>
<th>Brand A</th>
<th>Brand B</th>
<th>Panasonic (V3.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available Bandwidth</td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
</tr>
<tr>
<td>Actual Data Amount</td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
</tr>
<tr>
<td>Bandwidth Control: Low</td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
</tr>
<tr>
<td>Bandwidth Estimation Accuracy: Low</td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
</tr>
<tr>
<td>Packet Loss: Continues</td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
</tr>
<tr>
<td>Packet Loss: Continues</td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
<td><img src="image" alt="Graph" /></td>
</tr>
</tbody>
</table>

※ Packet Loss Rate (Exclude Error Correction Recovery)

- **Brand A**:
  - Available Bandwidth: Low
  - Actual Data Amount: Low
  - Bandwidth Control: Low
  - Bandwidth Estimation Accuracy: Low
  - Packet Loss: Continues

- **Brand B**:
  - Available Bandwidth: Low
  - Actual Data Amount: Low
  - Bandwidth Control: Low
  - Bandwidth Estimation Accuracy: Low
  - Packet Loss: Continues

- **Panasonic (V3.0)**:
  - Available Bandwidth: High
  - Actual Data Amount: High
  - Bandwidth Control: High
  - Bandwidth Estimation Accuracy: High
  - Packet Loss: Zero

**Far Strong against Bandwidth Fluctuation**

Check the actual video!
Accurate the available bandwidth estimation and high frequency rate control of encoder using TFRC + RTT variation.
What we need, research-wise and code-wise
Sensor networking as expected driving application

- Crowd sensing
  - Example
    - Waze
      - car traffic congestion
    - Nike fuelband
      - activity monitoring sportswear
    - CCNx Web-app ‘SHOUT’ @ ccnxcon2013
      - Share comments between neighbors
Features of Crowd sensing

- Collect data and make valuable “Information”
- Computing and Communication
  - of the people (crowd), by the people for the people
- by the people
  - New application is being made
  - Evolving continuously naturally if platform exist
Proposal: change the value chain

- Name will be used in terminal (application)
- To realize this, **stable open source is necessary**

**Current Status**
Everything on Cloud
Google is the value collector

**Proposed**
Make the new loop of value chain
Carriers or ISP should be the value collector

Name assignment and delegation rule

CCN/NDN Carrier, ISP
Tool kit (SDK)
Application
Power of Crowd
## Deployment milestones

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>L7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **L7**
  - 2013: Deploy baseline
  - 2014: Deploy basic network
  - 2015: Deploy advanced network
  - 2016: Deploy next-generation network
  - 2017: Deploy state-of-the-art network
  - 2018: Deploy ubiquitous network
  - 2019: Deploy fully functional network

- **L6**
  - 2013: Wire packet format (CISCO, PARC, etc)
  - 2014: Router proto (R&D) (CISCO, Alcatel, etc)
  - 2015: Stable software stack (NDN project -> Linux, *BSD)
  - 2016: Global routing method (university)
  - 2017: Mobility management (carries)
  - 2018: Security camera

- **L5**
  - 2013: Deploy baseline
  - 2014: Deploy basic network
  - 2015: Deploy advanced network
  - 2016: Deploy next-generation network
  - 2017: Deploy state-of-the-art network
  - 2018: Deploy ubiquitous network
  - 2019: Deploy fully functional network

- **L4**
  - 2013: Deploy baseline
  - 2014: Deploy basic network
  - 2015: Deploy advanced network
  - 2016: Deploy next-generation network
  - 2017: Deploy state-of-the-art network
  - 2018: Deploy ubiquitous network
  - 2019: Deploy fully functional network

- **L3**
  - 2013: Deploy baseline
  - 2014: Deploy basic network
  - 2015: Deploy advanced network
  - 2016: Deploy next-generation network
  - 2017: Deploy state-of-the-art network
  - 2018: Deploy ubiquitous network
  - 2019: Deploy fully functional network

- **L2**
  - 2013: Deploy baseline
  - 2014: Deploy basic network
  - 2015: Deploy advanced network
  - 2016: Deploy next-generation network
  - 2017: Deploy state-of-the-art network
  - 2018: Deploy ubiquitous network
  - 2019: Deploy fully functional network

- **L1**
  - 2013: Deploy baseline
  - 2014: Deploy basic network
  - 2015: Deploy advanced network
  - 2016: Deploy next-generation network
  - 2017: Deploy state-of-the-art network
  - 2018: Deploy ubiquitous network
  - 2019: Deploy fully functional network

---

**Service evolve**
- 2019: Service evolve (crowd sensing)
- 2019: Service evolve (BtoC)
- 2019: Service evolve (BtoB)

**Ex.**
- 4K Olympic
- Security camera

**Virtualization technology**
- 2019: Virtualization technology

**Prepare standardize**
- 2019: Prepare standardize (PARC -> IRTF)

**Discuss naming scheme**
- 2019: Discuss naming scheme (ENC)

**Standardize naming**
- 2019: Standardize naming (IETF -> IANA)

**SDK**
- 2019: SDK Issue name, location, time.
  (Carriers + Maker)

**Service platform**
- 2019: Service platform (data collection + search)
  (Carriers + Maker)

**File test**
- 2019: File test (Fixed)
- 2019: File test (mobile)

**Product develop**
- 2019: Product develop

**Facility investment**
- 2019: Facility investment (carrier, ISPs)

**Public TestBED**
- 2019: Public TestBED (government)

**Virtualization technology**
- 2019: Virtualization technology

**Global routing method**
- 2019: Global routing method (university)

**Congestion control/flow control**
- 2019: Congestion control/flow control (maker + carries)

**Prepare standardize**
- 2019: Prepare standardize (NDN project -> IRTF)

**Standardize**
- 2019: Standardize (IETF)

---

**Ex:**
- Security camera
Conclusion & Discussion

- Crowd sensing is the expected driving application
- Currently google (or SNS provider) suck the value of “Information”
  - As the result
    - carriers becomes “pipe” provider, maker becomes looser
- Change the value chain focusing on power of crowd. Because essentially data is generated at the edge terminals. Carriers or ISPs can collect it directly
- To realize this stable open source is necessary.