The Structural Evolution of Ottawa’s Digital Technology Sector: Understanding the Opportunities

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Local Context for Global Networks

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Ottawa ICT has experienced major internal & external shocks

- ‘Dot com’ collapse (2001)
- Demise of Nortel as anchor (2001-2009)
- Major transformative and disruptive digital change

"Even in the event the sector regains momentum, its highly unlikely it can create jobs in the same fashion as before"
Yet Ottawa remains a vibrant digital economy

- 47,000 employed in ICT (2016 Est.)
- ~1,000 companies
- Many new companies in leading subsectors
Need to grasp technology to understand Ottawa’s transition and digital opportunities

- SONET/SDH
- DMDW Optical
- Analog Wireless
- 2G Wireless
- Intelligent Optical Networks
- 3G Wireless
- Software Defined Networks
- 4G Wireless

Growth Index

% Change [Year on Year] Index

Global Internet Traffic
Evolution of networking technology

- **Telephony**
  - 1950s-

- **Networks for Internet**
  - 1990s-2000s

- **Networks for Cloud**
  - ~2010-

- **Networks for IoE**
  - ~2015-

Evolution is key part of Ottawa ICT story

- **Northern Electric / Northern Telecom**
  - Satellite and antennas
  - Digital switches

- **Nortel Networks**
  - Optical networks
  - IP networking
  - Wireless

- **New & Established Ottawa firms**
  - Software Defined Networks (SDN)
  - 4G wireless

- **Ottawa Role?**
  - SDN?
  - 5G Wireless?
Software Defined Networking – A foundation for Ottawa’s digital opportunities

**Apps**
- Cloud based applications
- Software as a service
- Apps program own network

**Control Place**
- Interface software
  - network control
  - data switching
  - traffic management
- Network security

**Data Plane**
- Hardware layer – dedicated ASICS
- Commodification of physical infrastructure

Source: CISCO
Industry structure reflects a transitioning to opportunities of advanced networks & cloud computing

• Characterized by:
  • Absence of a major anchor firm
  • Growth in cloud, network software
  • More MNC R&D activity
  • Decline in hardware / manufacturing (-50% 2001-2011)

• Innovation system in state of flux:
  • New associative structures and organizations (e.g. CENGN, KNBIA)
  • Re-focusing of existing organizations (e.g. NRC, CRC, Invest Ottawa)
  • Lacking cohesion
Three factors enabling transition: **Nortel**

- Seeded capabilities for next generation networking shift

**Change in Nortel Patenting, 1975-2012**

(Kogler & Spencer 2015)

**SDN relevant patent classes**

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Patents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller</td>
<td>Data Switching</td>
<td>Multiplexing</td>
<td>140</td>
</tr>
<tr>
<td>Resource Management</td>
<td>Packet Switching</td>
<td>347</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Circuit Switching</td>
<td>435</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Memory Management</td>
<td>384</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Traffic Management</td>
<td>592</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connection Management</td>
<td>33</td>
<td></td>
</tr>
</tbody>
</table>

Source: LexInnova, 2014
Three factors enabling transition: **Skills**

- Relevant to major digital trends
  - Mix of network hardware/software
  - Wireless
- Role of marquis firms
- Social media enabled communities of practice & meetups
Three factors enabling transition: MNCs

- Strengthening next generation technology R&D capabilities
- Nortel capabilities reorganized within Ottawa by MNC investment
- MNCs global production networks are being leveraged locally
  - Centre of Excellent for Next Generation Networks (CENGN)
  - Wesley Clover

2009
- Eriksson acquires Nortel wireless
- Avaya acquires Nortel enterprise assets

2010
- CIENA acquires Nortel Ethernet
- Huawei sets up R&D facilities with key Nortel empl.

2013
- Cisco systems expands R&D Centre

2014
- ZTE Ottawa R&D Centre, designs new smartphone in Ottawa

2015
- Nokia acquires Alcatel – Lucent, establishing Ottawa presence

2016
- Apple (vs. Blackberry 2.0)
Three questions

• Which policies have had impact?
  • Ottawa continues to benefit from government investments from 50 years ago era in radio and microwave
  • CENGN
  • Ontario support / investment attraction (e.g. CISCO, Huawei, Avaya)

• To what extent is Ottawa capturing value from its success?
  • Branch plant economy 2.0 (R&D)
  • Difficulty with scaling up

• Is Ottawa better off because of Nortel’s collapse?
  • Panarchy model – collapse and recombination?