YORK
UNIVERSITÉ
UNIVERSITY

Ongoing Strategic Adoption of 802.11n-Based Wireless Solutions at York University

Ian Lumb, Manager Network Operations
June 7, 2011

CANHEIT 2011
The Nature of Technology

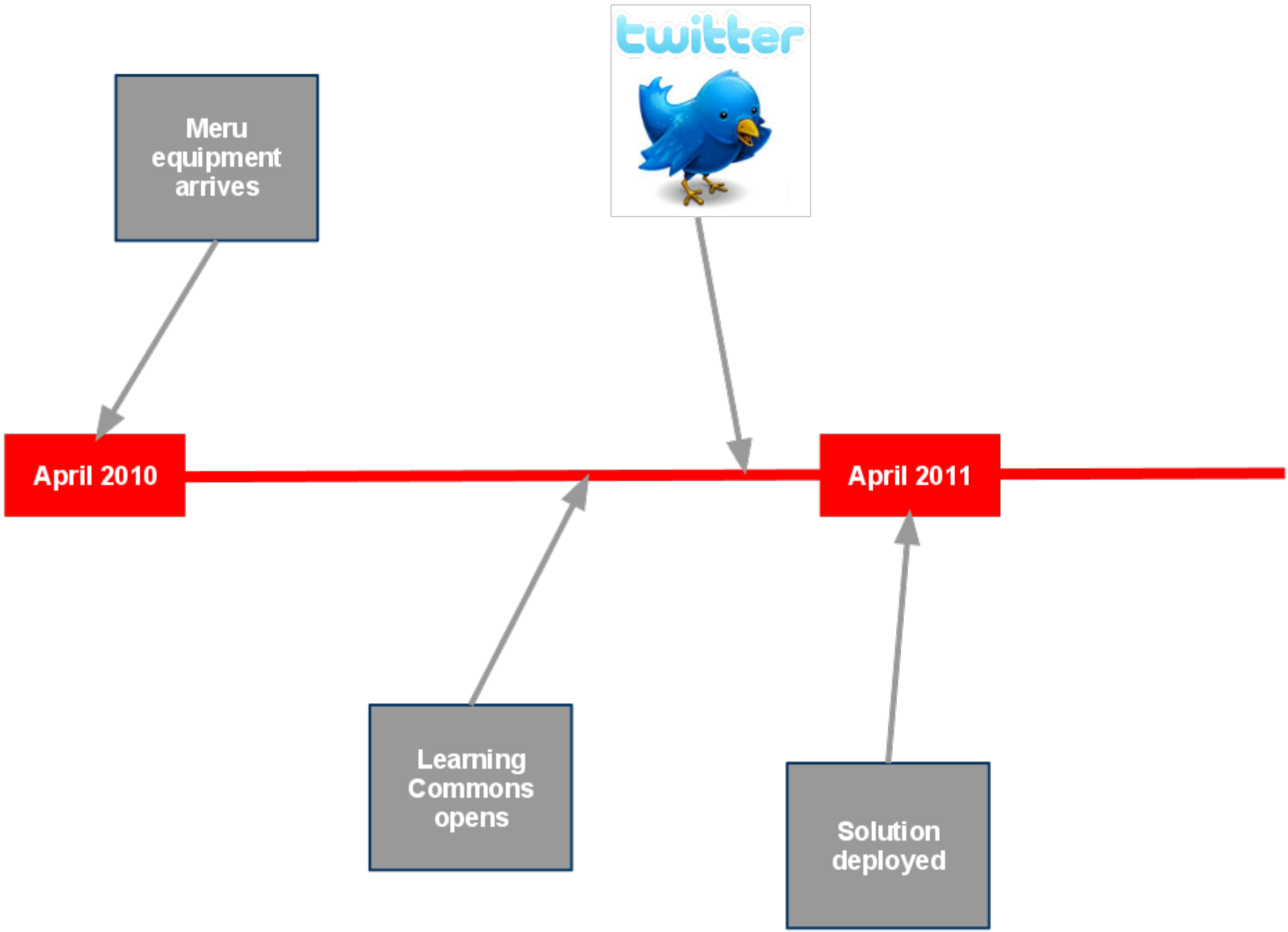
McMaster University
Hamilton, Ontario

CANHEIT 2010 Summary

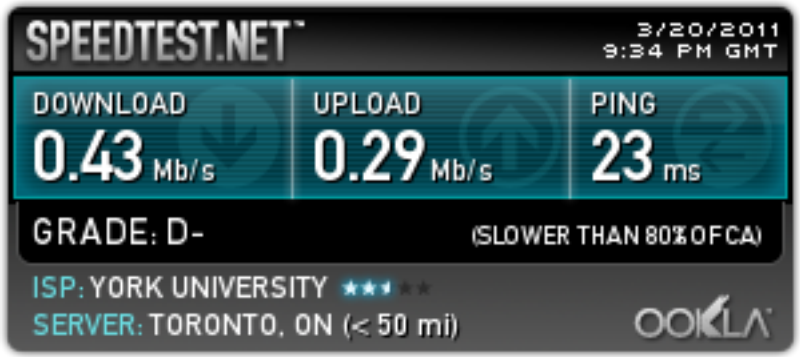
- Business and technical due-diligence
- Sole or single source certification established
  - Based on Meru's technical uniqueness
- Standing agreement established
  - Meru products/services via AMA
- Retrofit underway ...
  - 802.3af PoE is not enough
    - Access Layer Working Group

YORK
UNIVERSITÉ
UNIVERSITY

Scott Library


Meru equipment arrives
twitter
April 2010
April 2011
Learning Commons opens
Solution deployed

AirYork @ScottLibrary is "Slower than 93% of Canada"; and thats on a sunday afternoon! http://bit.ly/e8yyf0 #YorkU, #its2011, STEP UP!



Failure to Scale: The Problem

- Captive portal
  - Size of the iptables rulesets
    - Captive portal overloaded
- WiFi client associations per access point
  - Legacy infrastructure overloaded

Failure to Scale: The Solution

- Captive portal
  - Size of the iptables rulesets
    - Captive portal overloaded
      - Split users into a large number of smaller instances of Air Marshal
        - Make extensive use of VMware
- WiFi client associations per access point
  - Legacy infrastructure overloaded
    - Introduce Meru WLAN solution
      - Multiple radios per access point
      - Multiple bands available

Failure to Scale: Results

- Captive portal
  - Size of the iptables rulesets
    - Captive portal overloaded
      - Split users into a large number of smaller instances of Air Marshal
        - Make extensive use of VMware
    - Captive portal OK
- WiFi client associations per access point
  - Legacy infrastructure overloaded
    - Introduce Meru WLAN solution
      - Multiple radios per access point
      - Multiple bands available
        - 5.0 GHz users happier than 2.4 GHz

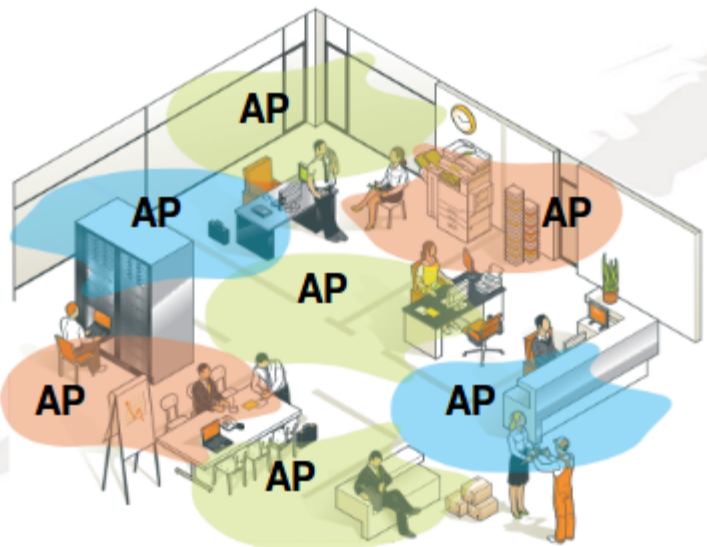
Failure to Scale: Ongoing

- Captive portal
  - Status quo
- WiFi client associations per access point
  - Legacy infrastructure overloaded
    - Introduce Meru WLAN solution
      - Enhance solution
        - Channel layering
        - Introduction of AP400?
          - Aggregate capacity > 1.3 Gb/s
          - 380 simultaneous mobile clients

The Choice:

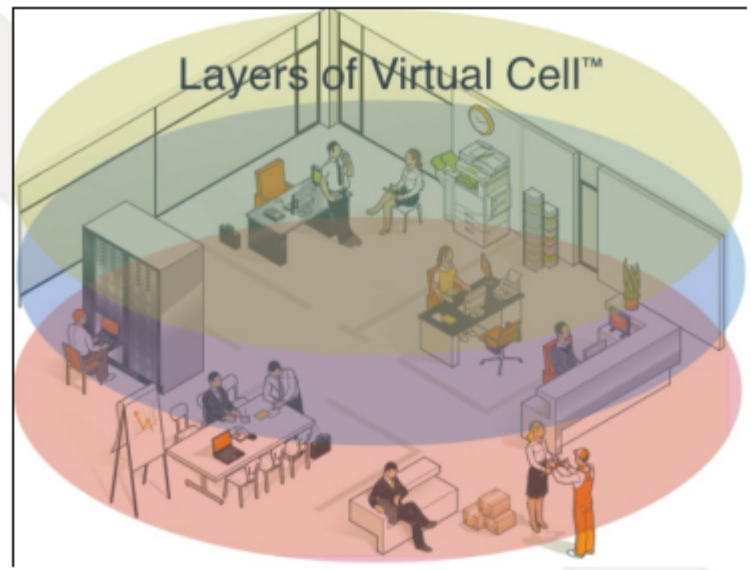
Legacy vs. Meru Innovation

Legacy Microcell deployments



- Coverage inconsistency
- Connectivity lapses
- Mobility challenges across the coverage area

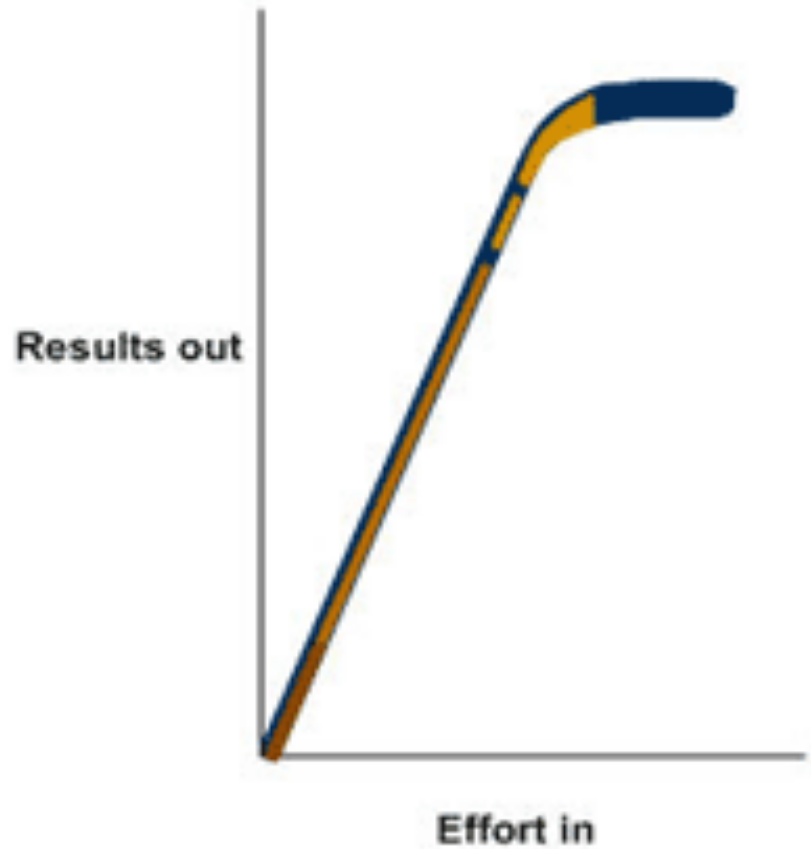
Virtualized WLAN



- Consistent coverage
- Layers for redundancy and capacity
- Best in class connectivity
- Reliable mobility
- *no handoffs across AP's*

MERU NETWORKS

Used with permission of Meru Networks


Results out
Effort in

Realities of WLAN Management to meet those demands

You are unable to eliminate problems UNTIL AFTER they service impacting (increasing user complaints)
You must increase the scale of the network and handle unique wireless problems, with FEWER IT resources
You must find the ROOT CAUSE of complex, unpredictable wireless problems
You must provide wireless everywhere with the same service levels REGARDLESS OF LOCATION

You need better visibility and predictability!

Meru Solution: Service Assurance Manager

- Makes use of virtual client
  - Associated to a specific access point
    - Packet-level interactions

ResNet - Current

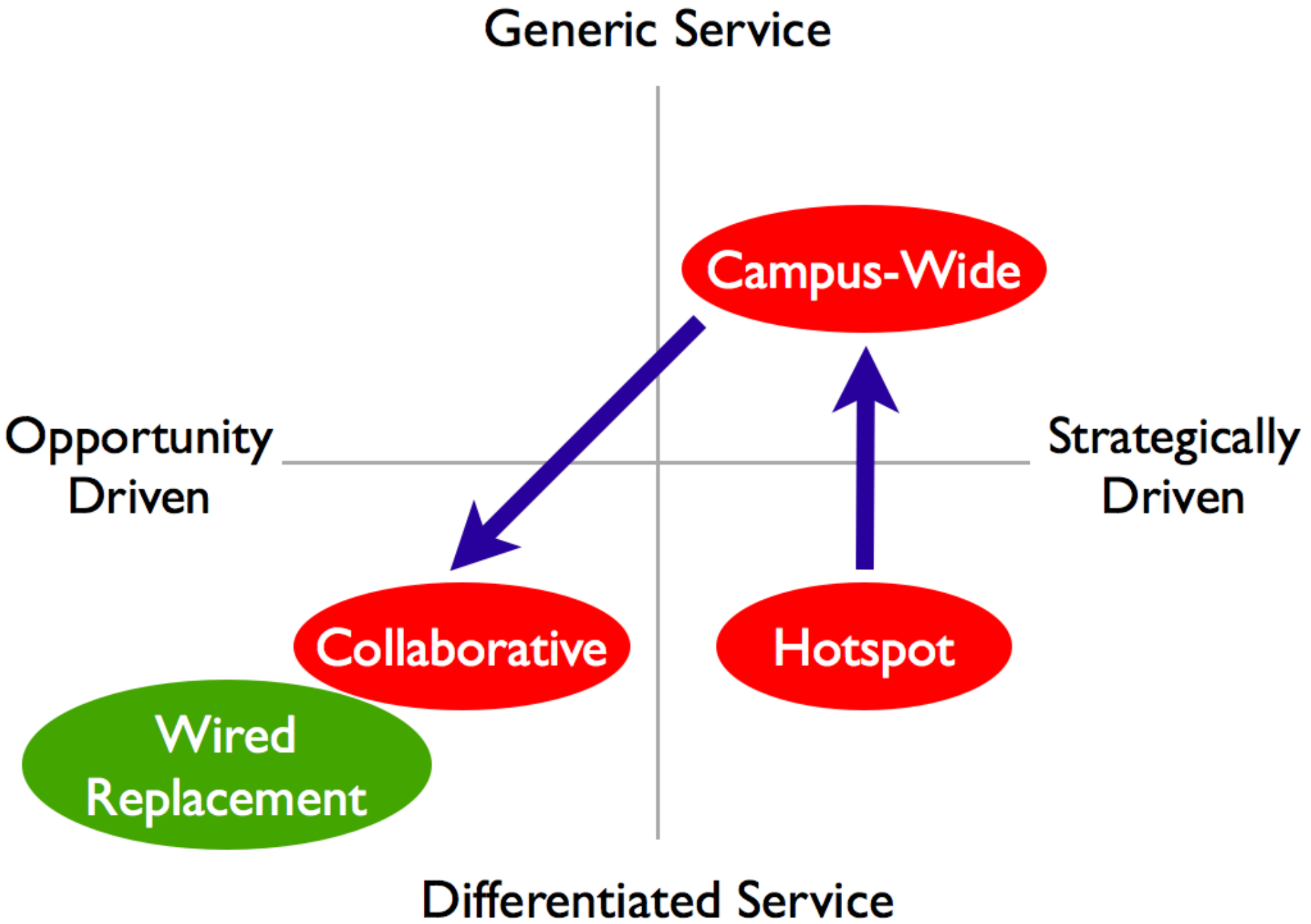
- Three solitudes for data, voice & TV
  - Data & voice infrastructures are antiquated
  - CATV business model mismatched

ResNet - Future

- All IP
  - 802.11n wireless network replaces wired
  - VoWLAN and/or cellular
  - IPTV?
  - Business model

Future Considerations

- 802.1x
  - EDUROAM
- IPv6

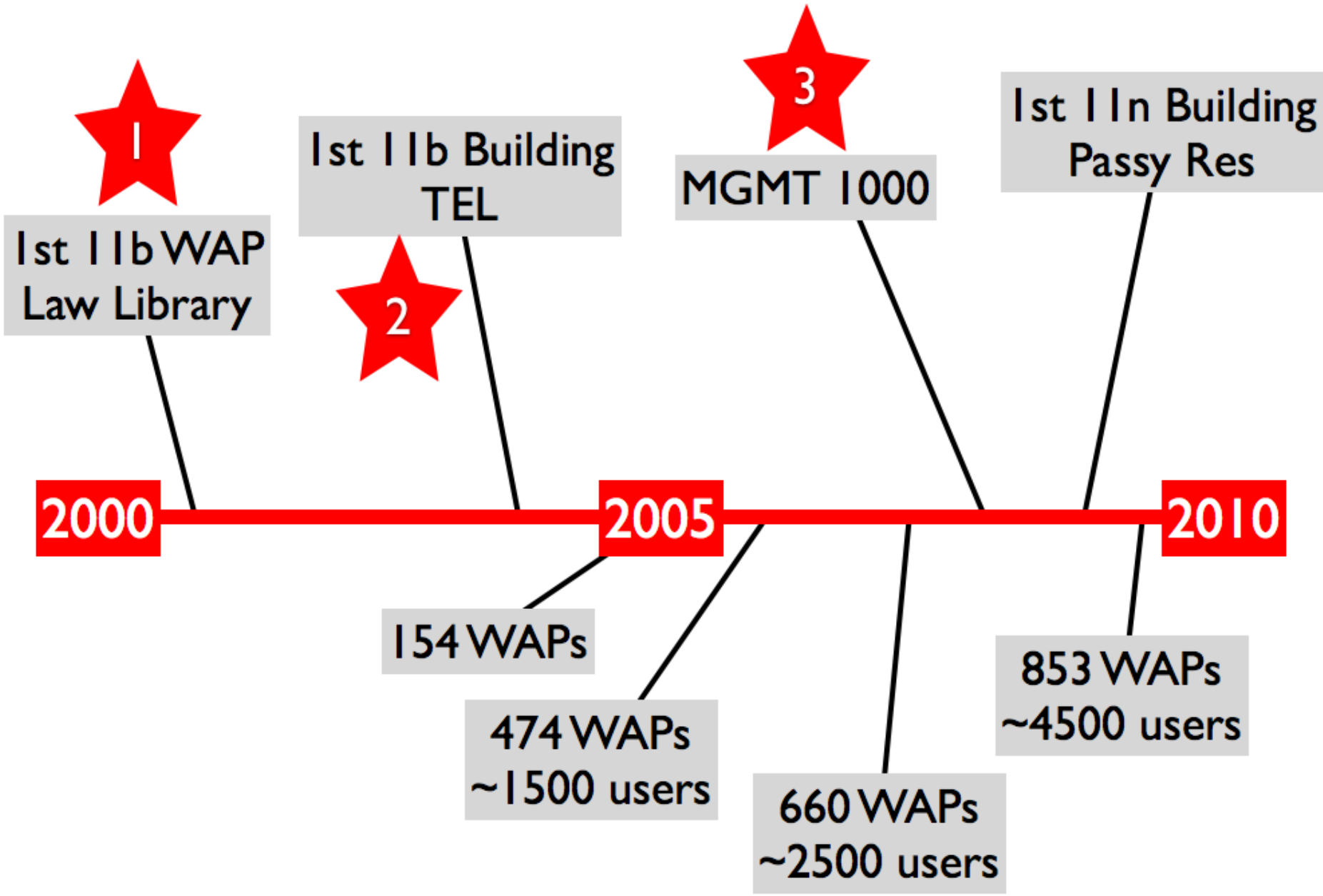

Generic Service
Campus-Wide
Opportunity Driven
Strategically Driven
Collaborative
Hotspot
Wired Replacement
Differentiated Service

University of Toronto

- One of the world's most highly regarded universities
- Largest Canadian university
  - 3 campuses
  - over 70,000 students
  - Staff and faculty: 20,236
- Increasing number wireless applications
- Meru Impact:
  - Upgrading legacy Microcell to 4th gen WLAN
  - Easy to deploy & scale: 1.5 people IT staff
  - 3,000+ Access Points projected
  - 5 x MC5000 HA Chassis
  - 9 Controller blades
  - E(z)RF providing centralized management
  - High performance, high density support everywhere
  - Ubiquitous transport

Used with permission of Meru Networks and U of T

Additional Slides


1
1st 11b WAP
Law Library
2
1st 11b Building
TEL
3
MGMT 1000
1st 11n Building
Passy Res
2000
2005
2010
154 WAPs
474 WAPs
~1500 users
660 WAPs
~2500 users
853 WAPs
~4500 users

Tactical Exposure to 11n

- Summer 2008
- Graduate residence
- Cisco controller + APs
  - APs require PoE+
    - Pre 802.3at standard
- Ubiquitous coverage

The 11n Difference

- Temporal multiplexing (≈ TDM)
- Spatial multiplexing
  - Multiple paths enabled via multiple antennas (MIMO)
- Channel bonding
- ...

York's 11n Tipping Point
Winter 2008-2009

- Success with tactical deployment in residence
- 11n standard in its final stage
  - Vendors ready to guarantee compliance
    - Anticipated software-only changes
- Market research
  - Identification of leading vendors

York Research Tower

- Summer 2009
- Meru controller + APs
  - APs require 802.3 af PoE
- High-density deployment
  - APs 50’ apart

Sherman Research Centre

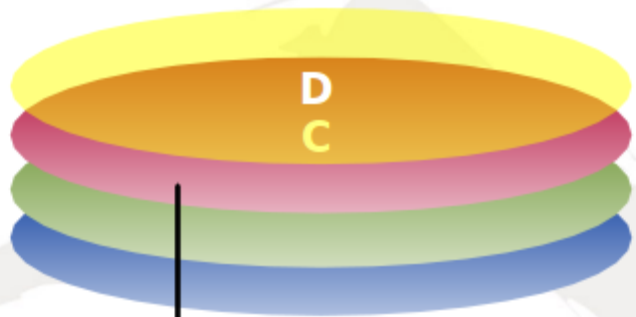
- Spring 2010
- Meru controller + APs
- High-density deployment

http://vgrserver.cs.yorku.ca/~vgrlab/VGRLAB/Events__2006_Aqua_entering_water.html


SSB
MGMT
1000
Courtesy Prof. Adams

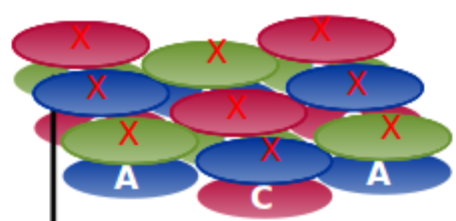
Increasing Capacity, Reliability and Coordination Using Channel Layering

Meru Solution



Available capacity in an area can be increased via channel layering
- Conference rooms, classrooms, all-wireless office

Conventional WLANs



Available capacity of 1 channel per area

MERU NETWORKS

Used with permission of Meru Networks