WiFi Technical Briefing: One Zone

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Today's Session

- Overview of Phase 1 deployment
  - Where are we today?
  - How did we get here?
- Technical presentation: Network architecture and design criteria
- In-depth view: network equipment
- Growth opportunities
- Q&A

Who we are

- Wholly–owned subsidiary of Toronto Hydro Corporation
- Over 450 km within Toronto connecting over 440 buildings since 2001
- Data centre operates 24/7/365, servicing some of Canada's largest financial and business customers
- Experienced team of qualified telecom professionals

Where we are

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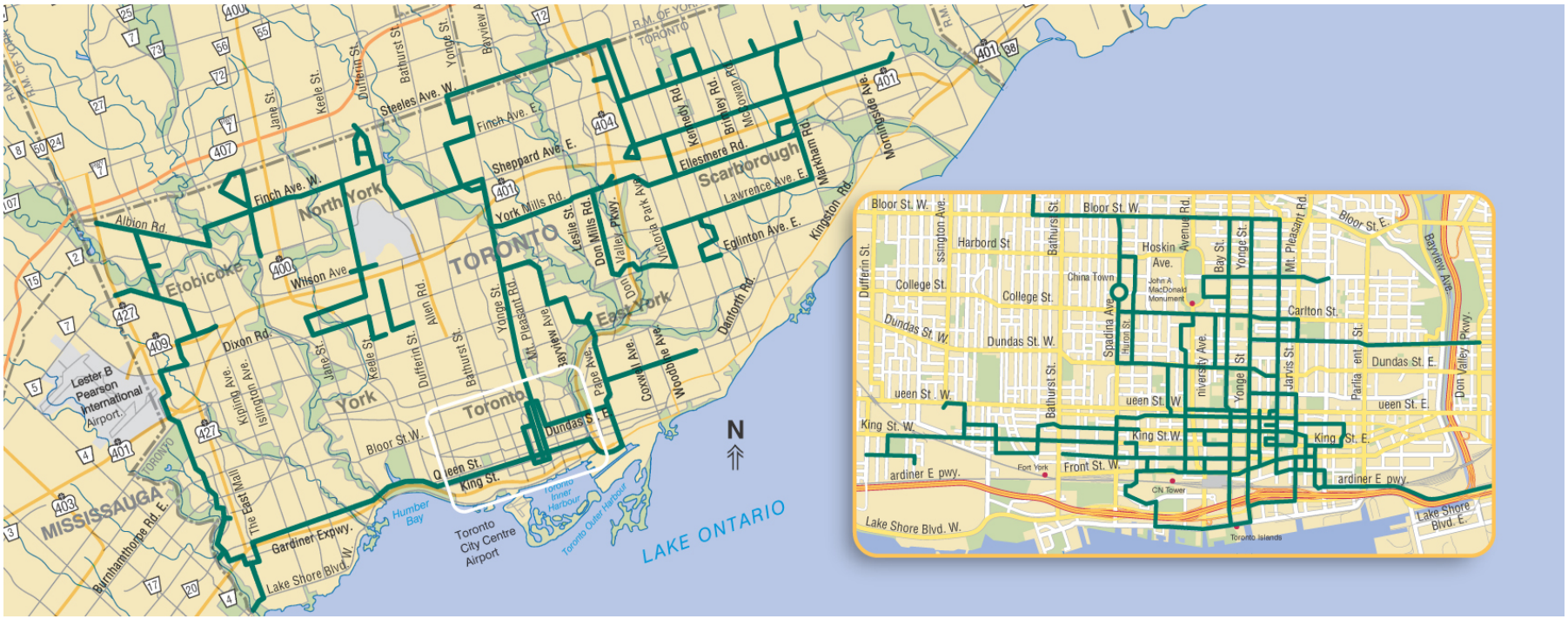


Services we provide

- Dedicated Internet Service
- Transparent LAN Service
- Private Line Service
- Voice over Internet Protocol
- Video Transport Services
- Storage Transport Services
- Advanced High Capacity custom services

Rationale: One Zone

Catalysts:

- Provincial “smart meter” legislation
- Under-utilized fibre optic network asset
- Toronto Hydro acquisition of 160,000 street lights from the City of Toronto

Who benefits?:

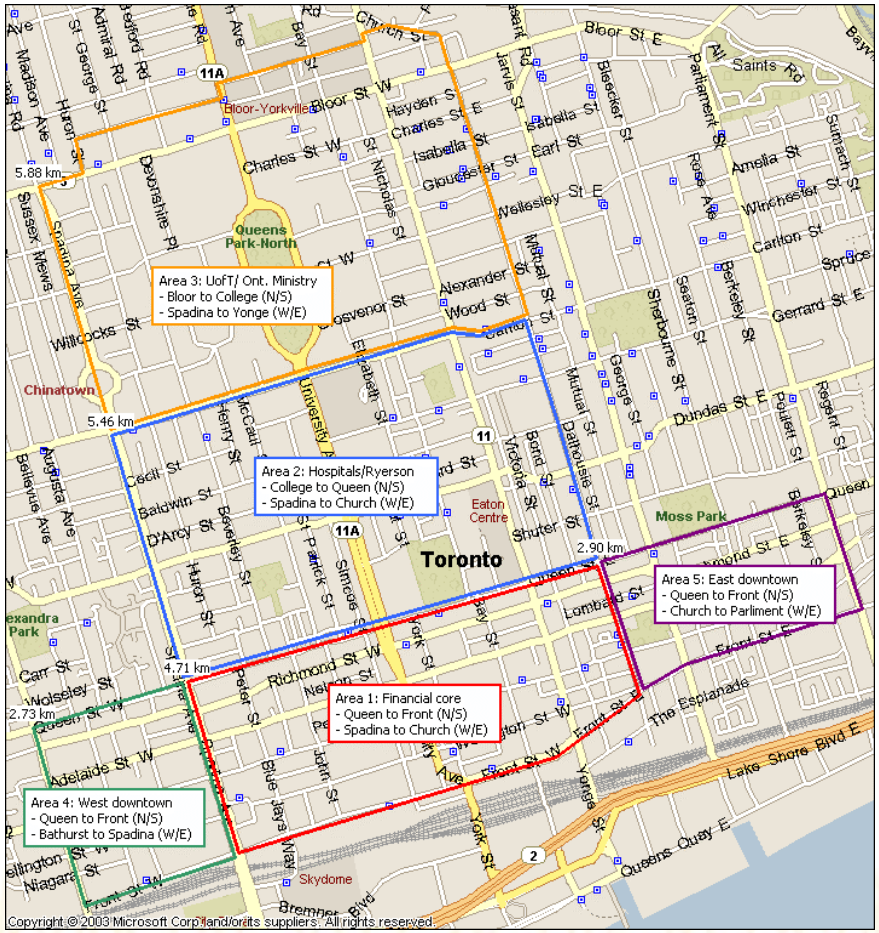
- Increased value proposition to our existing customers
- Increased value of corporate assets
- New revenue stream – new customer growth
- Increased value to shareholder
- Residents of City of Toronto via dividend to City

Rationale: One Zone

Economic benefits:

- Increased efficiencies for Toronto Hydro Corporation
- Greater productivity for an increasingly mobile workforce
- Greater efficiencies for businesses looking to work smarter – one zone, one tool
- Increased efficiencies for City agencies

One Zone



One Zone Roll-out

Phase 1: August 31, 2006
> Queen St. to Front St.
> Church St. to Spadina Ave.

Phase 2: October 2006
> College St. to Queen St.
> Church St. to Spadina Ave.

Phase 3: November 2006
> Bloor St. / Yorkville to College St.
> Church St. to Spadina Ave.

Phase 4: December 2006
> Queen St. to Front St.
> Spadina Ave. to Bathurst St.

Phase 5: December 2006
> Queen St. to Front St.
> Church St. to Parliament St.

One Zone Access Strategy

- Utilizes IEEE 802.11 standards, provides Internet access for computers & devices within the range of a base station
- Uses radio waves across a zone not just a hotspot
- Licensing: Unlicensed frequency spectrum
- Infrastructure: Toronto Hydro street lighting attachments
- Backhaul: Existing fibre infrastructure for backhaul from wireless Access Points
- Access Points: Selection of high capacity, high availability mesh radio architecture
- Devices: WiFi enabled devices ubiquitous in the marketplace

Opportunities / Challenges

- RF design: coverage density, backhaul redundancy, morphologies, performance
- Power, grounding, real estate, infrastructure availability
  - East west vs. north south on Yonge Street
- Authentication, activation, accounting
- Security, privacy
- Level of support & monitoring: NOC (Network Operations Centre), field, vendor, customer
- Marketing strategy: pricing, partnering opportunities, competition
- Potential municipal service applications

Official Phase 1 launch will take place on September 7, 2006

RFP/Deployment Process

Feb 8/06	Issued Wireless RFP
Mar 31/06	Awarded Wireless RFP
April 06	Vendor contract discussions; market studies; deployment planning
May 8/06	Vendor selection press release: Siemens Canada Limited
May 06	Phase 1 detailed network design and engineering
June 06	Deployment of One Zone network begins

Authentication Process

- Billing will be via credit card (consumer) and customer account (enterprise)
- Strong commitment to address authentication during 6-month ‘free’ period
  - Met with Police Services in May to discuss concerns with respect to facilitating inappropriate content and to offer solutions
  - Implemented a cellular phone SMS authentication process for free trial users
  - Will continue to review the viability of credit card authentication for the free trial period

Electromagnetic Fields (EMF)

Discussions held in May and early June with City of Toronto Public Health:

- Public Health is satisfied that our WiFi network complies with all pertinent safety guidelines and deems the network ‘low risk’
- Complies with Health Canada Safety Code 6 and Industry Canada RSS-102
- Engineering team is committed to ‘precautionary principle’.
- Network exceeds Toronto Public Health’s recommendations for 100 x the distance factor required under Health Canada's Safety Code 6.

One Zone: Nuts & bolts

- 235 city blocks of blanketed WiFi coverage
- 225 Access Points
- 25 fibre connection points
- 200 metres radius of coverage at street level from each Access Points
- 3 types of Access Points
- Approximate weight of largest Access Points: 15 Kg
- Same frequency as baby monitors, garage door openers, cordless phones
- 30-40 minutes to install each Access Points
- 70/30 split between omni-directional and directional antennae
- 6 square kilometres of blanketed coverage within 2006
- Old City of Toronto: 97 square kilometres
- New City of Toronto: 630 square kilometres

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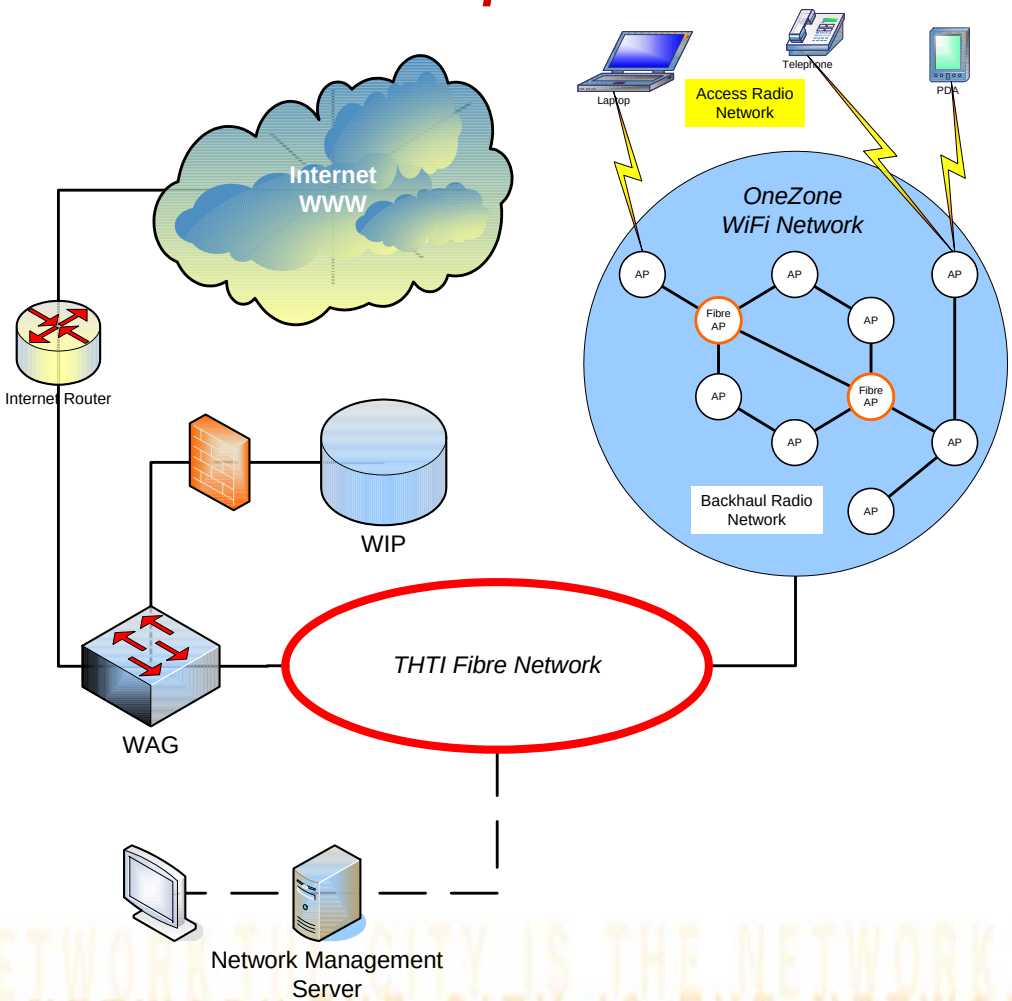
PHIL VLACH

Technical Lead, Toronto Hydro Telecom

WiFi Networks: Concept Architecture



Access Radio Network

- Allows end user to connect to the broader THTI network using standard 802.11b/g WiFi
- THTI network then routes traffic to and from the user to any connected private or public network, e.g. the Internet
- User connects to an Access Points (AP), which is a “point-to-point” link
- AP connects to several users at a time, which is “point-to-multipoint”

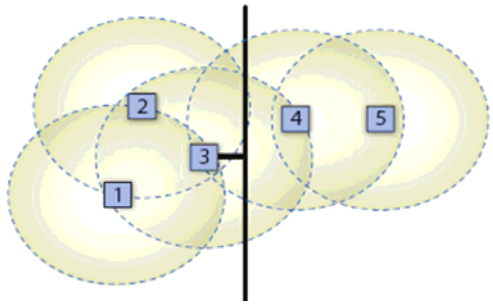
Backhaul Radio Network

- User traffic is forwarded using 802.11a WiFi from one AP to another until it reaches a wired (fibre) interconnection point within the THTI core network
- “Meshing” between APs to route user traffic reduces a major expense in the network: *installing wired fibre connections*
- Intelligence engineered into the mesh allows it to be *self-healing* if a link between APs becomes unusable
- Mesh backhaul provides a cost effective, robust way of moving traffic through the network

"Mesh" Configurations

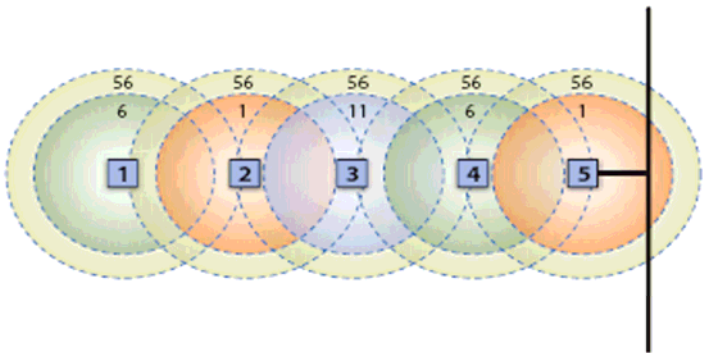
Single Radio Mesh

- Single channel used for both Access *and* Backhaul
- Easy and inexpensive to deploy
- Capacity limited on Backhaul *and* Access
- High latency – bad for Voice



Dual Radio Mesh

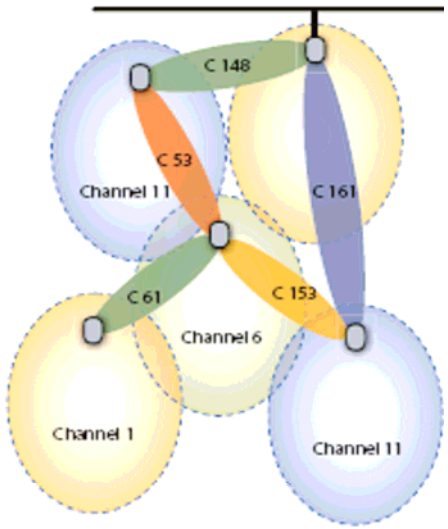
- 802.11b/g used for Access
- 802.11a used for shared Backhaul
- Improvement over Single Radio Mesh
- Capacity limited on Backhaul
- High latency – bad for Voice

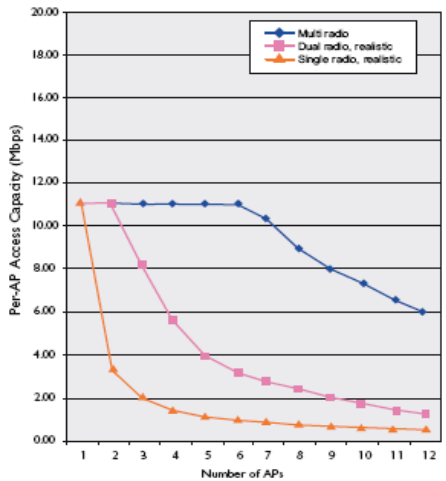


"Mesh" Configurations

Multi-Radio Mesh used for One Zone

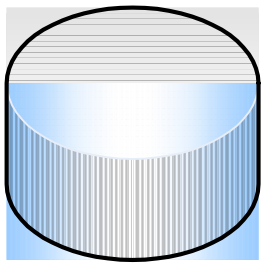
- 802.11b/g used for Access
- 802.11a used for dedicated Backhaul
- Highly scalable– best suited for Metro deployments
- Low latency – good for Voice
- High resilience to interference



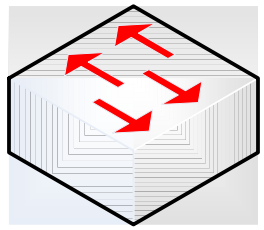


Why Siemens/BelAir?

- Depth of product portfolio
- High capacity multi-radio APs
- Fully standards compliant radios
  - 802.11 a/b/g/i/n/s, 802.1X
- Fibre interface APs
- Highly integrated, functional and scalable suite of WIP & WAG solutions
- Experienced engineering teams with expertise in wireless network deployments



WIP



WAG

Network Design: Objectives

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Services

- Smart metering
- High speed data
- Voice (future)
- Video (future)

Performance

- Quality coverage
- High capacity
- Traffic prioritization (QoS)
- High reliability
- Security
- Scalability
- Easy to deploy
- Fully standards based
- Cost effective initial rollout growth

Radio Network: Constraints

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Real Estate

- Pole availability & suitability
- Multiple pole types
- Not all poles have 24hr power
- Grounding requirements - ESA
- Certain areas have heavy foliage

Fibre Connections

- Right number to ensure reliability
- Duct availability
- Permitting required = time
- Cost

Building One Zone

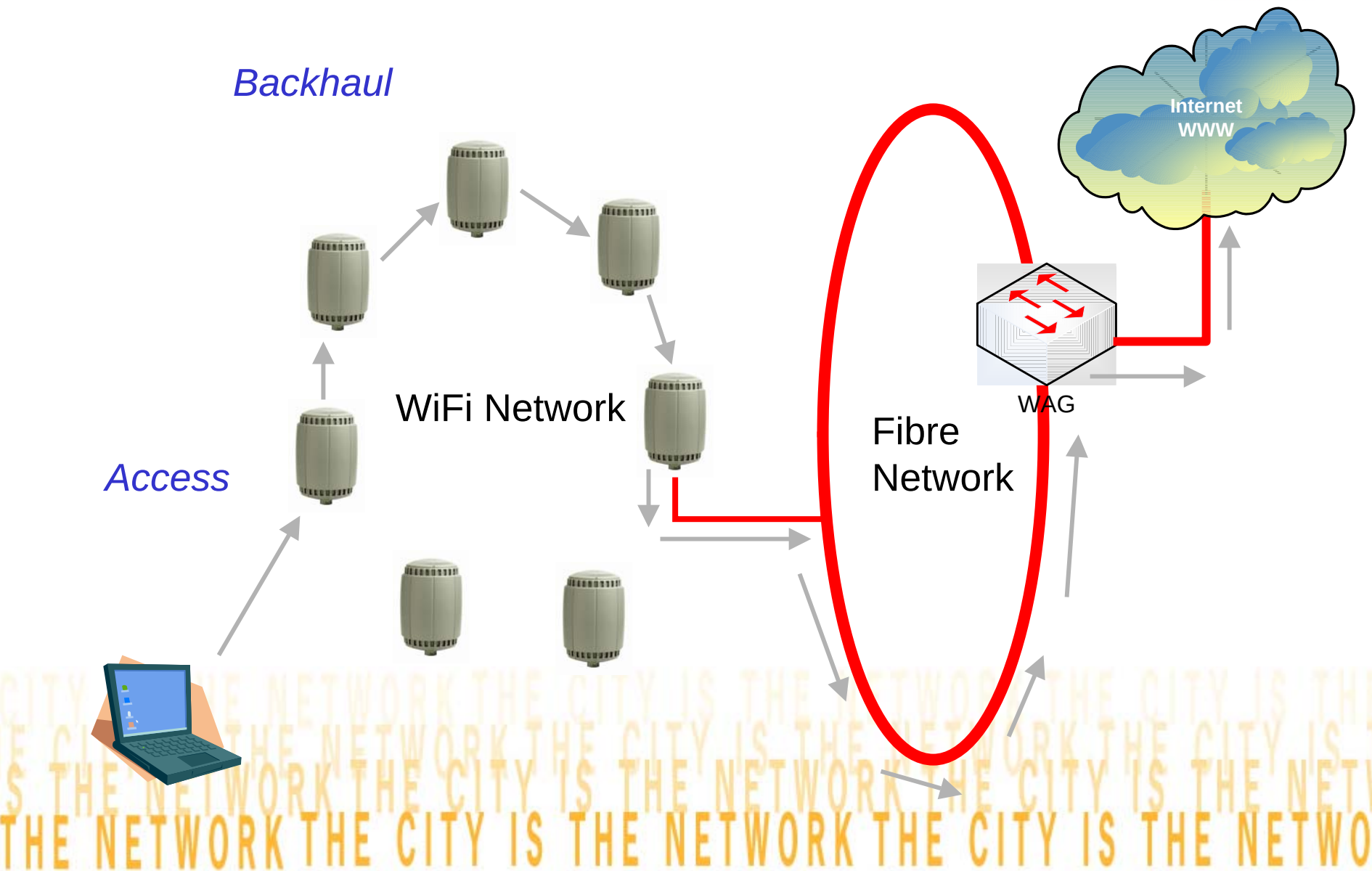
Installation

- Toronto Hydro Street Lighting crews contracted for installation
- Pole inspections required
- Fibre availability surveys done
- Grounding installed
- Access Points installed
- ESA inspections
- APs turned on

Optimization

- Coverage verification
- Performance verification
- Parameter fine tuning

How will One Zone work?



RON MANSI

Business Development, Siemens Canada Limited

SIEMENS CANADA

- Who we are, what we do
- WiFi networks we've developed around the world
- Uniqueness of One Zone
- Partnership with BelAir
- Fully compliant with all Health Canada and Industry Canada safety codes

WIP & WAG Functionality

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Integration

…for seamless integration of WiFi technology into an existing IT backend infrastructure.

Roaming

…for users of foreign operators by all important roaming standards.

SIEMENS
Wireless
Integration
@vantage

Accounting

…for users of WiFi that are not provisioned by the existing infrastructure.

Mobility

…for users of Fixed Network Operators that are able to use WiFi in a nomadic manner.

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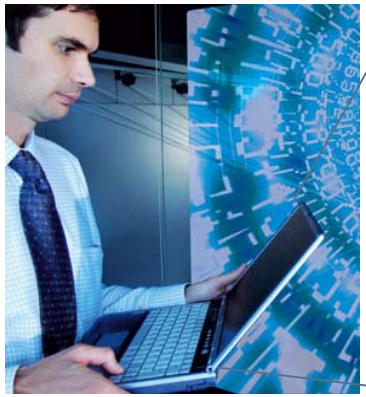

WISP
THTI
FNO

one hour
3 hours
24 hours

Subscription
Credit Card
Voucher
SIM card
SMS PIN

Please, enter your Mobile Number:

416 258 3419

Enter Access PIN Code:

1234

Welcome!

Your access is granted for 3 hours.

Wireless Technologies

WiMAX

WiFi

Flash -OFDM

Network Access Integrator

Voucher Manager

On/ Offline Charging

AAA Function

Portal Function

WIP

Interface module

Security Function

User/ Service Profile Mgmt.

Access Control

Networks

Fixed Networks

Mobile Networks

Internet Networks

ONE ZONE WiFI - Toronto Hydro Telecom - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites

Address http://66.241.128.31/one-zone/default.html Go Links

Google Search 92 blocked Check AutoLink AutoFill Options

Welcome to the
Toronto Hydro Telecom WiFi Zone

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ONE ZONE

NO STRINGS ATTACHED

HOME | SMS LOGIN | FREE PAGES | HELP |

ONE ZONE LOGIN

username:

password:

login

ONE ZONE

Welcome to ONE ZONE WiFi

We are very proud to announce our launch of ONE ZONE; a blanket of WiFi coverage in the downtown Toronto core, giving Toronto the largest ubiquitous WiFi coverage zone in Canada.

Are you a new user?

In order to access the system you will be required to use a username and password. To receive your username and password, please follow the steps below.

1. To access the WiFi network you will require an SMS enabled mobile phone.

(7 items remaining) Opening page http://66.241.128.31/one-zone/default.html... Unknown Zone

Start Novel... Micro... Mail F... 2006... Mail F... New ... Mail T... Mail F... ONE ... EN 1:06 PM

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Q & A