

ITS Canada 16th Annual Meeting & Conference
Toronto, Ontario

TORONTO'S WIRELESS COMMUNICATIONS PROJECT

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TORONTO'S TRAFFIC CONTROL SYSTEMS

- TransSuite Traffic Control System (TCS), supplied by TransCore ITS Inc. - 1327 signals.
- Main Traffic Signal System (MTSS), an interval-based system developed in-house , to be decommissioned by December 2014 with the conversion of all MTSS signals to the TransSuite TCS - 565 signals
- SCOOT (Split Cycle Offset Optimization Technique), supplied by Siemens Mobility Traffic Controls - 346 signals
- Aries, supplied by Econolite - 8 signals



CHALLENGES

- Need to move from legacy copper lines to Digital Channel Service (DCS) with conversion from MTSS to TransSuite
- MTSS conversion way ahead of telecom provider ability/willingness to provide service – up to 687 signals awaiting communication under TransSuite.
- Telecom provider not wanting to support DCS in future
- Impacted our ability to provide signal coordination – many complaints from politicians and the public.
- High communication cost, poor service



OPTIONS

- 1) Do nothing – 1000 signals would remain offline
- 2) Continue to install leased lines
 - require communication hardware purchase of \$320,000.
 - pay telecom provider a project management fee of \$300/intersection to expedite the CCS installations
 - capital cost of \$3M
- 3) Telecom provider recommended DSL service – just as expensive as existing
- 4) Convert lease line to wireless communication
 - capital cost of \$1.5M



LAB TEST

- April 2011 in City's lab
- Modem to modem with Telus EvDO modems
- 3 Controllers: Siemens EPAC, Econolite ASC/3 and Peek ATC-1000 with Ethernet Port
- Communicate with TransSuite Central System via wireless IP



PILOT PROJECT #1

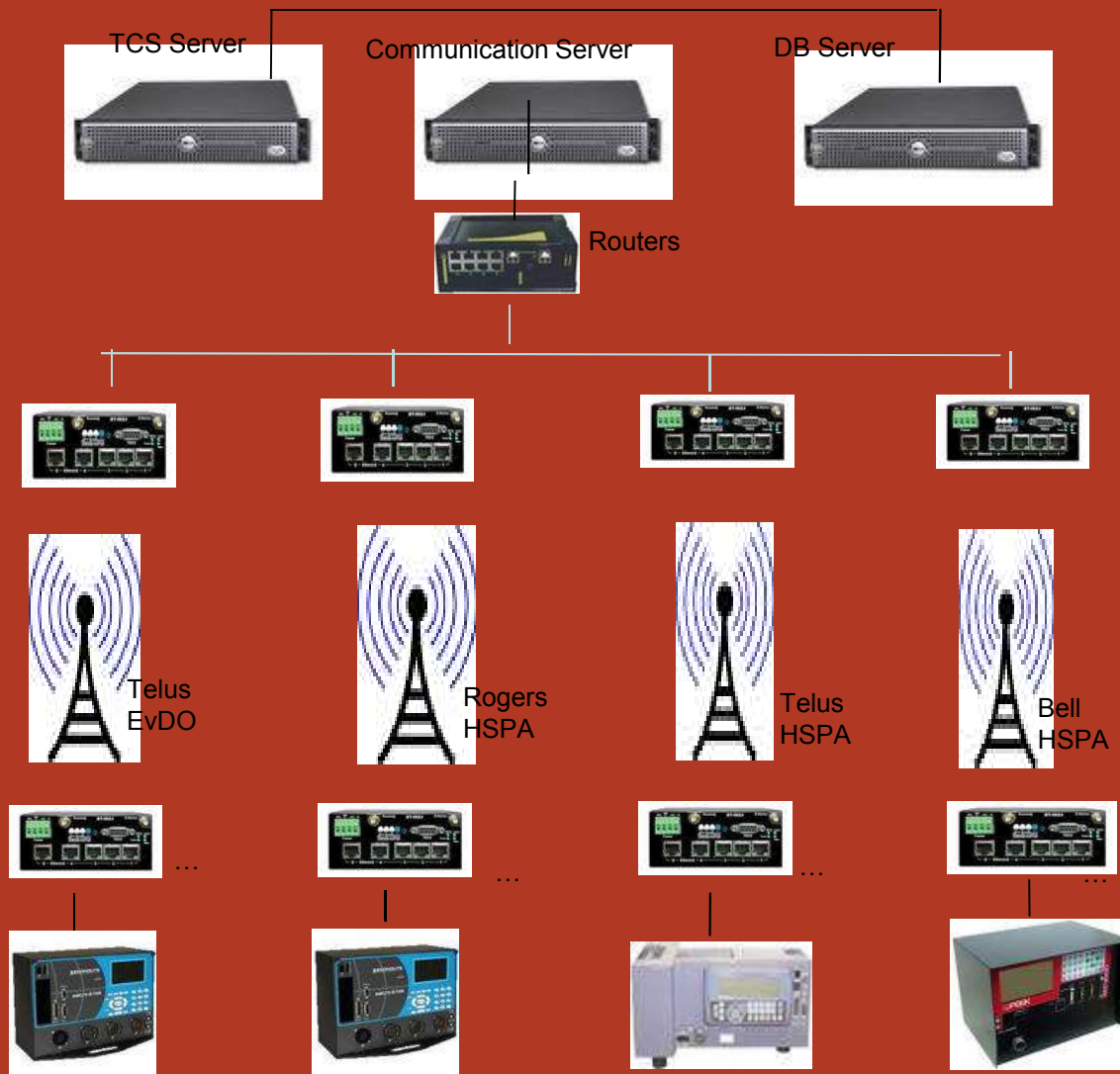
- May 2011 – field test at three intersections on TransSuite, known as St Clair Triangle (Kennedy Rd & Danforth Rd, Danforth Rd & St. Clair Ave, Kennedy Rd & St. Clair Av)
- Area subjected to complaints – closely spaced signals, loss of comm issue => no signal coordination and queue blockage
- Siemens EPAC 3668 M51 controllers (existing in the field)
- Cost - \$600



PILOT PROJECT #2

- Dec 22, 2011- 28 intersections communicating over wireless cellular network – point to point comm from field to central (703 Don Mills Rd)
- 12 on Rogers, 8 on Bell and 8 on Telus network
- Controllers - 12 Siemens EPAC, 15 Econolite ASC3, 1 Peek ATC-1000
- Capital cost – S31k (modems, antennae, cables, contract staff, City staff)
- Operating cost - \$30/month/intersection
- High Speed Packet Access (HSPA) modems – 13 Rogers, 9 Bell and 9 Telus

PILOT PROJECT





RISK ASSESSMENT

- Rollout halted by Corporate IT because of security concerns
- Hired consultant to undertake TRA (Threat Risk Assessment) to determine risks and to recommend mitigating measures
- Addressed major concerns - adding extra firewall, close unnecessary servers' ports, tighten up on access, private APN and MPLS connection etc
- Move to secure VPN managed by Corporate IT



Traffic Lights
Communicates to TMC Comm Server
in via private apr/vpn to City DMZ



Rogers Cellular Network
City of Toronto private app



Rogers Cell tower



Rogers IP Network



Rogers Internet VPN gateway



Internet

IPSEC
VPN



City Internet VPN gateway

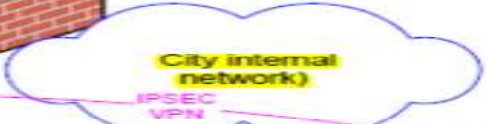


TMC Comm Server
in segregated DMZ
Communicates with Traffic Lights
and TMC private network only.



City segregated
DMZ via VPN

DMZ ASA



City internal
network

IPSEC
VPN



TMC ASA



TMC private
network



Minimal access to/from City internal network via TMC ASA NAT
Communications

TCSSVR Server

CCS1 Server

CCS3 Server

DBSERVER oracle database





CONCLUSIONS

- Cost effective - \$25/month through Corporate IT contract with Rogers
- Easy to troubleshoot - Web-based configuration and remote access can identify problem easily and decrease communication downtime
- Modern technology – IP
- Continuous support through Corporate IT – MOU signed
- Maintain second by second monitoring – 95 to 100% valid communication rate over most of the day



BENEFITS (1)

- Savings over current DCS - \$85/month/intersection
- Yearly operational savings: 2012 – \$76k, 2013 – 800k, 2015 - \$1.5M
- Maintain signal coordination
- Minimise down time
- Faster cheaper installation for new signals
- Better communication rate: FSK -1200 bps, DCS - 9600 Async/56K Sync baud rate, EvDO – 3.1M downlink & 1.8M uplink, HSPA – 14.4M downlink & 5.76M downlink



BENEFITS (2)

- Field equipment relocation easier - no additional cost of rewiring or excessive downtime
- Economy of scale through bulk modem purchase – price reduction from \$550 to \$400
- HSPA can accommodate CCTV Comm to new signals on activation
- Competitive environment (Bell, Rogers and Telus)



CURRENT STATUS

- Progress to date:
 - 2011 (pilot project) – 28
 - 2012 (implementation delay due to Corporate IT concerns) – 47; 100 modems purchased to Mar 2013 – 104 (installation contractor changed); 1500 modems purchased
- Future:
 - Apr to Dec 2013 – 600
 - 2014 – 700
 - 2015 - replace controllers that are not IP compatible and install wireless comm.



QUESTIONS

