

TORONTO TRANSIT COMMISSION REPORT NO.

MEETING DATE: FEBRUARY 27, 2008

SUBJECT: CELLULAR PHONES AND WI-FI IN THE SUBWAY

RECOMMENDATION

It is recommended that the Commission receive this report for information noting that at the Committee of the Whole meeting of December 6, 2007, approval was received to proceed with the following recommendations:

1. staff to issue the Request for Expression of Interest (REOI) to determine the interest of cellular phone carriers in providing cellular coverage in subway stations at their expense, and to estimate the potential revenue stream for the TTC;
2. staff to consult with Ontario's Information and Privacy Office to determine the applicability of privacy guidelines and regulations prior to the issuance of the REOI; and
3. staff to further review public Wi-Fi after additional operational experience has been obtained, and interference issues are better understood.

FUNDING

No funding is available in either the Operating or Capital Budgets to implement any cellular service or Wi-Fi public network.

BACKGROUND

- In November 2001, a report to the Committee of the Whole indicated that staff would undertake an investigation concerning unsolicited proposals from various private companies interested in installing cellular phone technology in the subway.
- In March 2002, the Commission authorized staff to undertake a study to determine interest from cellular service providers in providing cellular phone capability in the subway.
- In September 2002, Marketing completed a Wave 2 survey which included questions relating to cellular phones in the subway.

- In January 2003, a consultant's report on "Cell Phone in the Subway RFP" was submitted to the Commission.
- In March 2003, the Commission authorized staff to proceed with a Request for Expression of Interest to determine the level of interest of cellular phone carriers in providing service in the subway. At the same time the Commission reviewed the January report from the consultant and noted that the existing subway antenna system needed substantial upgrades to carry cellular traffic, and there was risk of interference to the Commission's radio communications from cellular equipment in the tunnels.
- In March 2004, Property Development, who was taking the lead on the "Cell Phone in the Subway RFP" determined that there was no longer a revenue opportunity from having cellular service in the subway.
- In April 2004, DGM – Corporate indicated that Toronto Police Service (TPS) did not support cellular service in the subway as cell phone detonation of bombs was a preferred method of terrorists. In addition, TPS and other emergency services, shared our concerns about interference to emergency radio communications in the subway. Any further investigation was terminated at that time.
- At the December 6, 2007 Commission meeting, a letter was presented from Ms. Jessica Hickman. Ms. Hickman wrote to the Commission to express some concerns about the potential use of cell phones in the subway. Staff contacted Ms. Hickman, at the Commission's direction, to provide any information she required to deal with her concerns and answer any questions she may have about the cell phone issue.

DISCUSSION

Cellular Phones

In the past several years cellular providers have mostly moved to the 1.9 GHz frequency band, therefore significantly reducing the possibility of interference with our existing radio system. At the same time, this completely eliminates any possibility of using our existing antenna system, leaving installation of completely separate infrastructure as the only option. It should be noted that a small risk of inter-modulation and radio equipment desensitization due to excessive use of cellular phones in case of subway emergency still exists.

Our recent investigation of other transit properties has shown that the idea of cellular phones in the subway system is being widely considered. However, actual implementation is limited. Chicago has only one cellular carrier operating in 2 of their tunnels, and Boston has completed only a trial since their 2005 agreement for 4 stations. Montreal's new antenna system, though compatible with cellular frequencies, has not yet been offered to cellular carriers. It was also noticed that although the focus of some transit authorities has been primarily on coverage in the stations, like the recent award issued by the New York MTA, the potential cellular carriers have not shown much interest unless coverage in tunnels is included.

The only transit system in North America that has been widely deploying cellular service in both tunnels and stations is Washington Metro. It has had a dedicated antenna system in operation since 2001, and has annual revenue of only \$27,583. The system is limited to "Verizon" customers only, and due to increased safety measures and restricted track level access, no upgrades to the system have been possible.

It should also be noted that due to the unique physical and environmental constraints that exist in our subway tunnels and increased safety procedures, deployment of such system would be extensive and require full involvement of the Commission's forces during installation as well as for future system maintenance.

Original anti-terrorism security concerns expressed by Police and TTC Special Constable Services have been tempered since the original report and it is now recognized that:

- mobile coverage in the subway system may provide first responder benefits, and
- cell phone infrastructure may not provide a tactical advantage for terrorists to initiate improvised explosive devices over other means currently available.

Based on a recent survey, over 60% of TTC users say the quality of service will not improve if TTC provides cell phone service in the subway.

Wi-Fi Network

Wi-Fi, also known as Wireless Fidelity, is a wireless technology intended to allow interoperability of wireless local area network products based on the IEEE 802.11 standards. The technology is designed to operate mainly in the 2.4 GHz band and there is a vast number of RF devices that currently operate in this band, such as microwave ovens, cordless phones, wireless cameras, PC's, game consoles, IP phones, MP3 players, and PDAs. Wi-Fi pollution, or an excessive number of access points in the area, especially on the same or neighboring channel, can prevent access or interfere with use.

The 2.4 GHz band is an unlicensed band which means that it can be used by anyone and there is no control with or coordination between the numerous other users of the band, therefore increasing the likelihood of interference. While the popularity of the band is a source of concern there has been an increasing deployment of Communications Based Train Control by public transit agencies that use the 2.4 GHz band, such as New York, San Francisco, Philadelphia, Las Vegas, Paris, Madrid, Singapore, Taipei, Hong Kong, and Seoul. Virtually all major signal system suppliers offer CBTC systems that operate at 2.4 GHz. Most of these systems use very robust techniques to ensure reliable and secure communication for the CBTC system.

Based on the experience of other transit properties, the Commission has chosen the same technology for the implementation of the Automated Train Control (ATC) system and is planning to install a distributed antenna system throughout the Yonge/University/Spadina tunnels. Until such time that the Commission's Communications Based Train Control system is specifically selected and it is proven that interference is no longer an issue, the risk of interference must be acknowledged and properly managed. The only real option for risk management is risk mitigation and prevention, and that includes detailed system engineering and reducing the number of potential users.

In addition to this, the Commission is also planning to use Wi-Fi technology for data transfer on the new Toronto Rocket Trains. The data will include train alarms and performance data, and access points are planned at Wilson Yard and in five subway stations: Downsview, Finch, St. George, Yonge/Bloor and Union.

Based on the report from the NOVA International Urban Railway Benchmarking Group, there are many transit agencies in the world that have been using Wi-Fi technology for either train control, real time CCTV streams, real time passenger information or train equipment monitoring, but currently none of them offer Wi-Fi inside trains for use by passengers.

Some agencies are prototyping the use of Wi-Fi for passengers in the stations but some reported interference problems (Nova Case Study: use of wireless and other data transmission systems in metros). As operational experience grows and technology improves, co-existing systems may one day operate with minimal interference, however at the present time it is recommended that the Commission refrain from offering public services in the 2.4 GHz band.

The recent survey completed by our Marketing Department showed that only about 6% of riders would pay for Wi-Fi service.

JUSTIFICATION

Cellular service poses some risk of interference with the Commission radios, therefore the Commission must first determine the level of funding interest before further work is done.

6-218-179
February 11, 2008
