CITY OF **VANCOUVER**

ADMINISTRATIVE REPORT

Report Date:	November 16, 2006
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TO: Vancouver City Council

FROM: Director of Information Technology

SUBJECT: City Telephone System Replacement

RECOMMENDATION

A. *THAT Council authorize the Director of Information Technology to prepare and issue a Request for Proposals for the necessary equipment, software, and implementation services to replace the City's existing localized telephone systems and services with an integrated in-house system based on Voice over Internet Protocol (VOIP) telephone technology as described in this report, including approval for up to $365,000 to fund activities supporting the RFP process; source of funding to be a reallocation of existing telecommunications capital funding.*

B. *THAT Council authorize the City Manager, in consultation with the Director of Information Technology, to approve award of a contract for consulting services to help develop and evaluate the Request for Proposals (RFP) for equipment and services, such contract expected to cost up to $50,000.*

C. *THAT the Director of Information Technology report back to Council no later than July 2007 with the results of the RFP process, final project cost estimates, a detailed funding plan and, if appropriate, a recommendation for award of an implementation contract.*

GENERAL MANAGER'S COMMENTS

The General Manager of Corporate Services recommends approval of the foregoing.

CITY MANAGER'S COMMENTS

The City Manager recommends approval of the foregoing recommendations.

COUNCIL POLICY

The City Manager can award consulting contracts up to a value of $30,000. Council awards consulting contracts over $30,000.

PURPOSE

The purpose of this report is to seek Council's approval to proceed with steps that will lead to the replacement of the City's existing telephone systems with a single, integrated, in-house system based on Voice-over-Internet-Protocol (VoIP) technology.

BACKGROUND

In December 2004, the City issued a Request For Information (RFI) describing its telephone environment and inviting the vendor community to recommend a strategy for its long-term evolution. Seven companies responded, offering a total of 11 alternative scenarios.

In April 2005, the City issued a Request For Proposals (RFP) for Centrex and Long Distance phone services. In anticipation of a possible new approach to providing phone services in the future, the RFP demanded the flexibility to reduce the number of phones over the contract period. Council awarded the contract to Telus in June 2005.

In September 2005, the City issued an RFP for consulting services to help the City develop a corporate telephony strategy, with the scope of work identified as:

- Gather information and review responses to the RFI;
- Conduct interviews with stakeholders, including vendors who responded to the RFI;
- Prepare and present a report recommending strategic, technical and architectural directions, and
- Develop a business case for proceeding.

In November 2005, Council awarded the contract for these consulting services to Planetworks Consulting Corporation. Work commenced in January 2006 and Planetworks presented their final report in August 2006.

DISCUSSION

Existing Phone Systems:

City telephone services are provided by several disparate systems:

- 2,200 phones in the City Hall campus, including the National Works Yard and the Spyglass Place building under the Cambie Bridge, are served by an in-house Private Branch Exchange (PBX) telephone switch, owned and managed by the City;

- 300 phones in the Manitoba Works Yard are served by a second PBX;
- 400 phones in the main library at Library Square are served by a third PBX;
- 1,400 phones in VPD are provided by Centrex Services leased from Bell Canada ;
- 1,250 phones in other facilities, including all Park Board and VFRS locations, are provided by Centrex services leased from Telus, and
- 70 phones in remote facilities are serviced by key systems (small in-house PBXs).

Voice-mail services to the users of these 5,620 phones are provided by 4 distinct systems with no integration between them.

The City-owned PBX and key systems are generally between 5 and 20 years old; one will become unsupported in 2007. Of the leased services (for Centrex, voicemail and trunk lines), one contract expires in 2007, two in 2008, and one each in 2009 and 2010. This is a good time to be planning their replacement.

Costs of operating these phones, excluding long distance charges (which amount to less than $50,000) and replacement of aging equipment, are:

Cost Item	**Annual Cost**
Centrex services	$1,025,000
PBX costs (Trunk charges, phone numbers, hardware & software maintenance, voicemail and other services)	$260,000
Staff costs associated with phone system management (Phone moves/adds/changes, support and maintenance, contract management)	$345,000
Total	**$1,630,000**

While phone services are generally considered to be highly reliable and there are few complaints about phone functionality, some areas for potential improvement have been identified:

- Call statistics are difficult, if not impossible, to aggregate across the whole City;
- Call centre functionality, generally referred to as Automated Call Distribution (ACD), while possible with some of the existing systems, has been under-utilized;
- The City has over twice as many blue pages numbers, apparently distributed randomly across multiple 3-digit prefixes, as most other Lower Mainland cities;
- Other than the web-based Quickfind, there is no centralized phone directory such as might be accessible through an automated attendant, and
- Inter-departmental phone services offer few of the conveniences, like conferencing, 4 or 5-digit dialling, call and voice mail forwarding and a centralized phone-based directory, that could be expected within an integrated organization.

Current Phone Technologies and Best Practices:

Traditional phone systems are being replaced by what are generally referred to as Voice-over-Internet Protocol (VoIP) or IP Telephony (IPT) systems. Instead of operating over a separate network of dedicated phone lines, these systems use the network that has evolved over the last 10-20 years to support data communications. The outward manifestation of this is that the phone (a new "IP phone") plugs into the same wall outlet as the ubiquitous desktop computer. Behind the scenes, the legacy PBX is replaced by a new "IP PBX" switch.

Current market research indicates that:

- Over 70% of large organizations are using, testing, or planning to deploy VoIP technology;
- In the enterprise market, sales of IP-based phones and IP PBXs now exceed sales of their traditional counterparts and will constitute over 90% of the market by 2010, and
- 75% of corporate telephony systems will be VoIP systems by 2009.

Examples of local organizations that have deployed VoIP include VanCity Credit Union, UBC, IBM, and Vancouver Airport Authority. In the municipal government sector, the cities of Coquitlam, Longueuil, Mississauga, Oakville, Quebec City and San Jose, CA, have deployed VoIP and were interviewed by Planetworks about their VoIP deployments. All reported positive outcomes.

There is broad consensus that VoIP is the future of telephony, although the timing will vary from one organization to the next.

A preliminary assessment identified that a leased service model, very similar to Centrex but using VoIP technology, would not offer all the advantages of in-house VoIP and would not be cost-effective. Similarly to Centrex, this type of service is priced on a per-phone basis, but still demands significant upgrade of the data network.

The City Data Communications Network:

Implementation of VoIP technology is dependent on the data network's ability to support it – its extent, capacity and robustness.

In terms of extent and capacity, the situation is good and the timing fortuitous:

- The City Hall complex is completely interconnected with an optical fibre backbone which can support VoIP with minimal upgrades;
- In the last 5 years, the main departmental buildings outside the City Hall complex, including the 3 main VPD buildings, the main library, the Park Board main office and the Manitoba and National Works yards, have similarly been connected with optical fibre that can comfortably support VoIP;
- Of the over 100 smaller City facilities (community and recreation centres, branch libraries, fire halls, and miscellaneous small offices), around 50 are connected by optical fibre now and another 30 are expected to be connected by the end of 2007;
- The data needs of the approximately 25 remaining facilities are provided by slower leased telecommunications links. It may be possible to run VoIP over these links, but

if the capacity is inadequate they may simply retain their Centrex phones. There are fewer than 120 phones – 2% of the total – at these locations.

Despite the broad extent and more-than-adequate capacity of the network backbone, significant upgrading of the data network, particularly the "last 100 feet" between the point where the optical fibre enters the building and the wall outlets that service phones and computers, is needed.

Migrating to VoIP:

In the City's case, the cost of the existing Centrex services dominates the business case. While the PBX-based components of the existing City phone system are quite cost-effective, the opportunity to save on Centrex costs and the benefits of an integrated system call for an early migration.

The benefits of replacing the existing phone systems with a City-wide VoIP system extend beyond the cost savings:

Improved customer service:

- The review of phone usage that will be a necessary part of the project will present opportunities to rationalize public-facing phone numbers and internal dialling plans;
- If Council decides to proceed with a 311 Call Centre implementation, a VoIP-based City-wide phone system will facilitate forwarding of calls and voice-mails throughout the organization and integration between phone and computer systems;
- Interim to a full 311 implementation, the Automated Call Distribution (ACD) features could be used at a departmental or work-group level to consolidate the call handling that is currently broadly distributed.

Operational efficiencies:

- Maintenance, and expansion as needed, of a single converged network rather than two parallel (data and voice) networks;
- Response that is consistently fast across the organization to the constant requirement for phone moves, adds and changes;
- Ease of phone relocation: One of the major benefits of IP phones over conventional phones is the ability to simply unplug them, move them to another location, and plug them in again, with calls automatically following the phone. This capability will be valuable to highly mobile work groups, like many in VPD, and can even extend outside the City network for telecommuting or off-site meetings, although whether this will be implemented depends on a rigorous analysis of the security implications;
- Unified messaging, presenting e-mail, fax and voice messages through a single desktop interface;
- The necessity to upgrade the network infrastructure will improve the robustness of the data network, important as the demands for 365x24x7 availability of systems and information access increase;
- Consolidated management of a single system is more efficient than management of several disparate systems;

- Call statistics, such as number of incoming calls by work-group and length of wait time to a call centre, can be generated more easily and used to optimize service levels.

Business continuity:

- Multiple IP PBXs and multiple connections to the public telephone network can provide redundancy, reducing the number of single points of failure (e.g. the PBX in the sub-ground floor of City Hall) and better enabling the City to continue communicating with its customers through any kind of failure or disaster;
- Locating the IP PBXs in the City's hardened data centres will make them less vulnerable either to natural or man-made threats;
- The ease of phone relocation described above would be a major benefit in the event of an emergency which necessitates the relocation of a work-group;

Risks and Issues

Technological change, and the organizational changes associated with it, always introduces risks that must be mitigated and issues that must be addressed. Areas identified in the project initiation report include voice quality, availability, network security, 911 automatic location identification, and the potential for disruptive transition.

High level mitigation strategies have been identified to address these issues and will all be fleshed out in the detailed design phase of the project. Based on the experience of the many organizations that have already implemented VoIP, none of them presents a significant risk to a successful implementation.

FINANCIAL IMPLICATIONS

To decide if there was a business case for proceeding with in-house VoIP, a detailed technical and financial model was developed for three scenarios, each projecting out 10 years:

- A "Status Quo" model: continuing with the existing phone systems, upgraded as necessary to meet anticipated business needs and replace obsolete equipment;
- A "Centralized VoIP" model: replacement of the existing phone systems with an in-house VoIP system in a centralized configuration, and
- A "De-centralized VoIP" model: replacement of the legacy systems with an in-house VoIP system in a de-centralized configuration.

As the de-centralized model offered significant benefits, particularly in terms of security, autonomy and availability through redundancy, and was only marginally more expensive than the centralized model, that model was preferred and will be referred to as the "VoIP" model; the centralized model will not be discussed further in this report.

Projected costs of the two models, including both operating and capital costs (some of which in the Status Quo model would need to be funded in future Information Technology Infrastructure Expansion and Replacement programs), are compared in the following tables:

Status Quo	Total Telephony Costs by Year (Millions of $)										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	TOTAL
Equip. Replacement	0.5	0.6	0.4	0.4	0.4	0.5	0.6	0.6	0.6	0.5	5.1
Operating	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	17.2
TOTAL	2.1	2.3	2.1	2.1	2.1	2.2	2.3	2.4	2.4	2.3	22.3

VOIP	Total Telephony Costs by Year (Millions of $)										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	TOTAL
Capital	2.0	2.4	2.2	0.8							7.4
Equip. Replacement							0.6	0.6	0.7	0.7	2.6
Operating	1.7	1.4	1.1	1.1	0.9	0.9	0.9	0.9	0.9	0.9	10.7
TOTAL	3.7	3.8	3.3	1.9	0.9	0. 9	1.5	1.5	1.6	1.6	20.7

These tables illustrate that after incurring capital costs of $7.4 M in 2007-2010, the deployment of a VoIP-based telephony system can be expected to generate savings of approximately $0.7 M per year relative to the status quo by the time a "steady state" is reached in 2016, clearly supporting deployment of VoIP over maintaining the existing phone systems.

Approximately 70% ($5.2M) of the capital costs are for the VoIP hardware and software, new phones, and implementation, consulting and project management services; 30% ($2.2 M) of the costs are for the necessary upgrade of the data network infrastructure.

A key initial step in the implementation is to issue an RFP for the necessary equipment, software and implementation services.

Although based on a comprehensive and detailed model, the costs presented here for the VoIP system are estimates only and will remain so until an RFP has been issued and the responses reviewed. Consulting help will be engaged to help staff refine the system's design architecture, establish some core implementation parameters, develop the RFP and evaluate responses. Cost of this engagement is not expected to exceed $50,000. To expedite the process, Recommendation C seeks approval to have the City Manager, in consultation with the Director of Information Technology, award this consulting contract.

Staff will report back to Council for award of contract, final cost estimates and a detailed funding plan by July 2007. However, it is anticipated that it will be possible to fund the implementation as follows:

VoIP Phone System Deployment over 4 Years 2007 - 2010		$ (Millions)
Total Capital Costs		7.4
Funding re-allocated from telecommunications infrastructure replacement[1]		(0.4)
Cost savings relative to Status Quo costs:		(3.3)
- Information Technology Infrastructure capital financing [2]	$1.0M	
- Savings from existing operating and equipment replacement budgets	$2.3M	
Shortfall to be financed from loan, repayable through operating savings		**3.7**

1. On Nov 1 2005, Council approved the Information Technology Infrastructure - 2005 Expansion and Replacement Program. The report identified a $1.31 M program to upgrade some components of telecommunications infrastructure. A sub-program included upgrades of data cabling at remote sites at a cost of $365,000 – upgrades which have been deferred pending the outcome of the VoIP study. While these upgrades are still required, it is preferable that they be performed in the context of making the data network ready for VoIP, and it is recommended that the funding be re-allocated to the extent necessary to provide for engagement of a project manager, consulting assistance in developing the RFP, and beginning work on network assessment and readiness preparation.
2. Phone system upgrades are normally funded through an Information Technology Infrastructure Expansion and Replacement Program, presented periodically to Council for approval. $1 M is identified for phone system upgrades in the 2006-2008 plan and would have been requested under the Status Quo model.

PERSONNEL IMPLICATIONS

No net change in staffing is projected to result from this technology change. Approximately 5 FTEs are needed to support and administer the existing phone systems; the same number is projected for the VoIP system. The project plan and budget provides for necessary training. No major changes in responsibilities are anticipated, and any identified during or after implementation will be addressed through the normal processes.

Training will also be provided to the phone users. For the majority, the new phones will be so similar to existing phones that little or no formal training will be necessary (although there is an allowance for some in the project plan and budget). Training in the more advanced features will be provided as needed to the small number (estimated at 22) of Call Centre Attendants and the larger number (estimated at 214) of receptionists.

IMPLEMENTATION PLAN

It is anticipated that the project would begin implementation in the fall of 2007 and be completed by 2010. By 2013, the life-cycle management of the system would see the first equipment replacement cycle implemented.

The key implementation activities and schedule are expected to be:

Date	Activity	Approx. # of phones migrated
Q1 2007	Initiate project; Hire/assign Project Manager; Begin detailed design; Engage consultant; develop/issue RFP for equipment and implementation services.	
Q2 2007	Evaluate RFP proposals; Continue detailed design; Council award of contract(s).	
Q3 2007	Work with selected vendor(s) to refine design; Network readiness assessment & upgrades for pilot deployment; Procure & install core VoIP equipment and gateways to public phone system.	
Q4 2007	Pilot deployment and testing in Corporate IT department and other selected locations; Begin network readiness assessment & upgrades for 2008 deployments.	100
2008	Deploy phones at VPD and other City Centrex sites, except VPL; Begin network readiness assessment & upgrades for 2009 deployments.	2150
2009	Deploy phones at PBX-based sites (City Hall complex, VPL, Works Yards) & VPL branches; Begin network readiness assessment & upgrades for 2010 deployments.	2550
2010	Deploy phones at balance of sites serviced by optical fibre.	700

The numbers may be adjusted either as detailed plans are developed, or during deployment based on experience, but the migration is expected to be completed during 2010. A complete implementation plan will be included in the July 2007 report.

If it is decided to proceed with a 311 Call Centre, it would not be advisable before the VoIP core equipment and gateways are installed and tested at the end of 2007. While VoIP is not *needed* for 311, financial and operational penalties would be incurred if a call centre were deployed and integrated into the legacy phone system, only to be subsequently migrated to a VoIP system.

CONCLUSION

The recommendations in this report have been presented to internal stakeholders across all departments and boards. There is a broad recognition that the benefits extend beyond the long-term annual financial savings of $750,000 to improvements in operational efficiency, customer service and business continuity. The Corporate Management Team has expressed its endorsement of the initiative.

It is recommended that Council approve staff taking the next steps towards implementation of a new City-wide phone system.

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