TRANSFORMING THE PROCUREMENT OPERATION WITH INFORMATION TECHNOLOGY

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Abstract

Electronic procurement transforms the traditional purchasing process for most organizations. It streamlines and automates the logistics in procurement from requisition, sourcing, approval to goods receipt. Many companies select to begin the transformation from operation resources management (ORM), which focuses on indirect materials acquisitions, to enjoy the efficiency gains, shorter cycle time and procurement cost savings.

The Hong Kong SAR Government has taken the initiatives to adopt e-procurement as a leading example to the business community. Electronic Tendering Service (ETS) was introduced in April 2000 to promote the use of Information Technology in public procurement.

In this paper, we will illustrate how e-commerce and e-procurement have emerged to influence the business environment. We will describe the Hong Kong SAR Government's efforts to transform its traditional procurement process and how GSD and its suppliers benefit from ETS. We will also discuss the security issue in transacting through the Internet as well as user's concerns of using the system. The paper will be concluded by describing the future opportunities of electronic tendering system especially after China's accession to the World Trade Organization (WTO).

Keywords: automation, efficiency, Electronic Tendering, e-procurement, ETS, security, streamlining, supply chain management

Introduction

Internet has become an indispensable tool for business to implement their purchasing plans. According to a latest report conducted by the Institute for Supply Management (ISM) and Forrester Research, Inc in the fourth quarter of 2001, companies purchased 9.5% of their indirect materials and 6.2% of their direct materials through the Internet, as compared with figures in third quarters of 7.1% and 5.3% respectively (www.forrester.com). However, the research indicated that less than 10% of interviewed companies have dramatically changed their procurement procedures through the Internet. It concluded that e-procurement was still in the early stages (Stacy Crowley, 2001).

Another benefits from e-procurement arise from better collaboration with organization's suppliers, employees, franchisees, stakeholders and customers. Through better communication, improved transaction and automation between those partners, organizations are able to reduce cost and strengthen supplier relationship. Supply chain management (SCM) is regarded as an important task for most organizations to improve relationship with their suppliers, manufacturers, wholesalers and distributors.

Evolution of e-procurement and its impact to the business community

Electronic Commerce and Internet Procurement

Expenditure on electronic commerce (e-commerce) is growing rapidly despite of global economic turmoil. In Asia, it is estimated that the total transaction value through the Internet will exceed US$430 billion by 2003. e-Procurement represents a significant proportion in the view that it benefits users in achieving certain extent of supply chain efficiency.

Several findings on the overall Internet adoption researched from 361 responding organizations:

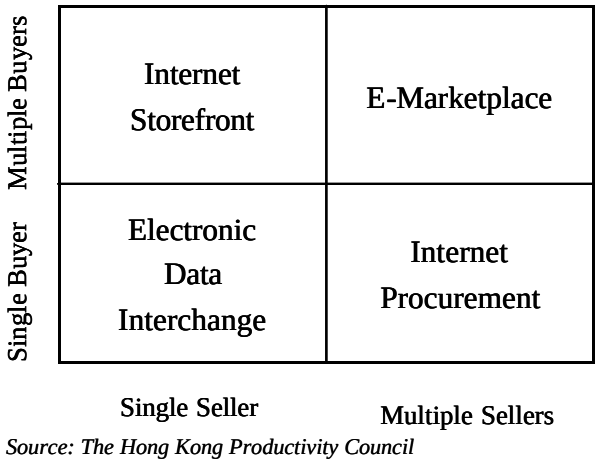
- online efforts slow down due to economic downturn;
- significant progress for organizations to adopt online purchasing;
- Internet procurement are important for large-volume purchasers;
- large-volume purchasers are achieving cost savings through e-procurement;
- procurement processes in organizations are changing due to the introduction of Internet.

Electronic commerce refers to any electronic communication that facilitates the exchange of goods, services or other assets between buyers and suppliers. It includes activities such as e-procurement, e-marketplace, e-customer service, e-transportation/logistics and e-payment. The burst out of the dot-com bubble arouses companies' awareness to re-consider their IT plan and spending. Managers began to realize the significant cost and process savings by e-procurement through automating and streamlining the non-production goods and services acquisition internally.

What is e-Procurement?

e-Procurement is the use of the Internet to access and exchange large volume of data for business-to-business e-commerce transactions between buyers and suppliers (IDC, 2001). It can help organizations to improve processes, increase productivity, reduce costs and thus enhancing supply chain management (SCM).

The business-to-business e-procurement platform can be divided into four quadrants based on the number of buyers and sellers in the market as shown in Fig 1.



Source: The Hong Kong Productivity Council

Fig 1 The Business-to-Business e-Procurement Platforms

Electronic marketplace has brought many companies' attention these days. It refers to the websites that allow both buyers and sellers exhibiting their products, posting requests, placing orders or even settling payments online. However, there are many so-called "e-marketplaces" serving only as bulletin boards that allow information display with contacting information. Interested parties must interact and transact through conventional or traditional methods. There are very few marketplaces supporting full and complete business-to-business integration with shipment logistics and payment process. Regardless of its immaturity, the Gartner Group believes that by 2005, more than 50,000 companies will be participating in B2B e-marketplaces by acting as buyers, sellers or both.

Companies want an easy implementation for promising gains will start with Operation Resources Management (ORM), which focuses on the internal efficiency and achieve cost/resources savings in the procurement process. Operation Resources Management involves the purchasing of non-core items, or known as indirect items like office supplies or MRO (maintenance, repair and operations) provisions. Those items account for a large proportion of a company's expenditure and a sizable company may spend up to 30 to 60 per cent on indirect goods and services. Through traditional procurement channels, much of these purchase requisitions are bypassing central guidelines through local or regional offices leading to poor control and costly process. It is understood that any saving from these spending will result in profit increase. Pricewaterhouse Coopers (PwC), an international consultancy points out that a 10 per cent reduction in purchasing cost will result in a 30-50 per cent increase in profit margin (Fig 2).

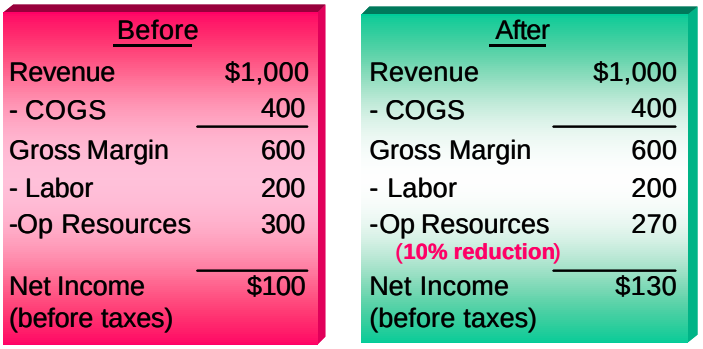


Fig 2 Financial benefits of e-procurement: EPS Improvement Illustration

Other benefits from e-procurement includes:

- lowered procurement administration through streamlining and automation;
- improved data gathering and reporting on company expenditures;
- improved compliance with corporate contracts and reduce "maverick" buying;
- shortened requisition and order cycles;
- enhanced negotiations power with suppliers;
- enablement of procurement professionals to focus on more strategic tasks.

(Aberdeen Group, Inc 2001)

Impact of e-Procurement

The e-procurement market is estimated to reach US$5.3 billion in value by 2003, according to the International Data Group. The Forrester Research also forecasts the number of companies using Internet procurement will reach double increase by the end of 2002.

Electronic procurement transforms the entire supply base and delivers massive savings to the company's Return On Investment. Business transactions become seamless since buyers and sellers are interacting and transacting through the Internet network. This results in automation of transaction process, electronic sealing of buyer-

seller relationships, improvement in service level and significant cost reductions (Deloitte Consulting, Fall 1999).

Electronic procurement will also eliminate the barriers between buyer and its suppliers thus promoting e-collaboration between both parties. This collaborative network can also be expanded to not only suppliers, but also service providers, strategic partners, contractors, integrators, extended enterprise technology and business teams. Supply chain management (SCM) can be achieved through faster and active interactions between buyers and sellers. Costs can be driven out of the sourcing process for buyer while enabling a just-in-time manufacturing process to support quick response for sellers.

e-Procurement in Hong Kong – A Government Initiative

Digital 21 and e-Procurement

The Hong Kong Digital 21 Strategy was formulated to achieve the vision as "a leader and not a follower in the information world of tomorrow" through the use of information technology (IT) since 1997. The Information Technology and Broadcasting Bureau (ITBB) was set up to commission the strategy and oversee its implementation. Its primary focus was to build capabilities and infrastructure to support a thriving information economy and to promote the use of IT to develop Hong Kong as a world' s premier business city.

Digital 21 Strategy ensures that the Hong Kong Government will lead by example in the use of e-business internally and in its service delivery to the public. The government will carry out flagship projects to the benefits of both government and the public in four categories: Government-to-Citizen (G2C); Government-to-Business (G2B); Government-to-Employee (G2E) and Government-to-Government (G2G). In 2001 Digital 21 Strategy Document, five Key Results Areas (KRA) are formulated to promulgate a comprehensive E-government strategy.

e-Procurement was one of the highlights and form as an important part of the strategy under Government-to-Business (G2B) category. It aims at achieving huge savings for both Government and its suppliers through the adoption of e-procurement and at the same time, encourages the suppliers to adopt e-business. The Electronic Tendering System (ETS) was the first implemented project in transforming the existing procurement system of the Government.

What is ETS?

Fig 3 Electronic Tendering System

The Electronic Tendering System (ETS) is an internet-based electronic tendering system adopted by the Government Supplies Department (GSD) of the Hong Kong SAR Government. It was developed and operated by Global e-Business Services Limited ("GO-Business"), a subsidiary of Computer and Technologies Holdings Limited (SEHK: 0046). ETS is the first G2B electronic tendering service in the world that allows both way tender document exchange whereas many similar systems only allow one-way traffic. ETS allows two-way not only on submission but also on clarifications, query, addendum, postponement, etc.

ETS is accessible by suppliers at any place any time. It is a secure repository for companies (whether or not they are registered suppliers of GSD) to access and download latest tendering information from GSD, including tender notices, tender documents, tender clarifications and addendum as well as notifications of contract award. By subscribing to the service of ETS, subscribers could access the system by simply entering their username and password through a standard Internet browser. Virtual tender boxes would be created by GSD to receive tender proposals submitted by suppliers through secured electronic channel over the Internet. Online help and guidance are available to ensure ease-of-use. All transactions processed by ETS are recognized under the newly enacted Electronic Transaction Ordinance (ETO).

Objectives of ETS

The principal objective of ETS is to make the procurement process, specifically for tendering, more open, fair and transparent. It aims at promoting the use of Information Technology by setting as an example to the business community and to support environmental protection by advocating the use of less paper. Other objectives for ETS includes:

- Extension of Reach Without Boundary – ETS brings information to the attention to even new suppliers who may not access to the Government Gazette or the local press, resulting in improved value for money in Government purchase through a broadened supplier community

- Operational Efficiency and Cost Savings – ETS simplifies internal workflow of both GSD and its suppliers by reducing the demand for printing, binding and dispatching of documents in hard copy. By streamlining the purchasing process, reducing paperwork and re-keying jobs, ETS will assist GSD to reduce administration cost and storage space.

- Highly Secured Transaction Platform – ETS provides a highly secured framework through the use of the Hong Kong Post Public Key security Infrastructure (PKI). It ensures all transactions to fulfill the principles of privacy/confidentiality, integrity and authenticity

Uniqueness of ETS

Being an early project under the Government's Digital 21 Strategy, ETS is the "first" G2B electronic tendering website in the world that supports two-way true transaction process to allow online tender posting and submission. It sets an unprecedented example for Government to outsource the tender / procurement services to a third party contractor.

ETS is the first application to be recognized by the Electronic Transactions Ordinance (ETO) in April 2000. Under ETO, all subscribers of ETS must obtain a digital certificate issued by the Hong Kong Post. The digital certificate contains information about the name of the owner as well as information of the issuing authority. ETS submission requires the use of Hongkong Post eCert for individuals and businesses to authenticate suppliers' identity.

ETS deploys strong encryption technology through PKI-based security framework to ensure extremely high level of data confidentiality, integrity and identity authentication. To ensure extreme security during transaction, GO-Business had appointed Hong Kong Productivity Council as an independent consultant to endorse and audit the full system design and technical infrastructure. ETS has passed through four rounds of audit tests before release and is subject to annual system security testing.

There are several outstanding features of ETS:

- Supports bilingual language in Chinese and English versions to suit different subscribers;
- Enables both open and restricted (invitation) tenders (restricted tenders only allow access of invited suppliers with the valid access code);
- Time-stamping from the Real Time Service offered by the Hong Kong Observatory, an independent third party, to reduce the conflicts relating to the tender submission time, tender closing time, etc;
- Pay-as-you-use model operated by an Application Service Provider (ASP) which means ready to market, proven solution and minimal setup cost, bringing significant cost savings for both GSD and its suppliers.

Traditional Tendering vs Electronic Tendering System

Procurement Functions of the GSD

The Government Supplies Department (GSD) is the central purchasing, storage and supplies organization for the Government of the Hong Kong Special Administrative Region serving over 80 government departments, subverted organizations and certain non-government public bodies. The annual purchasing value for GSD reaches HK$5-6 billion with approximately 2,300 contracts awarded per annum.

One mission statement communicated by GSD is to deliver a responsive and efficient procurement service through strategies that enable customers to obtain goods and services value for money. Open, fair and high transparent procedures without bias to one particular supplier are the principle for procurement procedures. The government procurement procedures are in line with the Agreement on Government Procurement (GPA) established under the World Trade Organization (WTO) and are subject to the governance of the Stores and Procurement Regulations (SPR) issued by the Financial Secretary.

Traditional Tendering System

Before the introduction of ETS, all tenders need to go through manual processes which consists of seven stages:

Step 1: Preparation of tender documents and specifications

GSD, acting as the purchasing agent, will collect inputs from the end-user and any specialist authority. For those contracts which could not be awarded on the basis of price alone, GSD will devise the marking scheme to be included in the tender document.

Step 2: Issue of invitation to tender

GSD will publish the tender notice in the Government Gazette and four local newspapers. The tender notice will contain information such as product to be purchased, the address where tender documents can be obtained, time and place for tender submission. To enable participation of overseas suppliers, copies will also be delivered to trade consults in Hong Kong.

Step 3: Dispatch of tender documents

A copy of the tender documents would be delivered to all registered suppliers. It will also be available for collection during government office hours.

Step 4: Receipt of offers

All tender offers must be deposited in the tender box before the specified tender closing date. Upon closing time, the tender box will cease from receiving bids. After tender box opening, all received bids will be recorded under strictly controlled conditions.

Step 5: Tender evaluation

Offers will be evaluated to check whether the products and services offered comply with the tender specifications. Marks will be awarded for each quality feature when marking scheme is used in tender preparation.

Step 6: Submission to tender board

Tender Board will ensure the fair and proper tendering procedures during the whole purchase as well as the offer recommended are value for money. Different tender board will perform the administration depending on the contract value.

Step 7: Contract formation

Upon tender board approval, a letter of acceptance will be sent to the awarded contractor. This letter is drawn up and signed by both the contractor and the Director of Government Supplies on behalf of the Hong Kong SAR Government. Awarded contractors will be published in the Government Gazette. Unsuccessful contractors will also be informed separately with reasons stated.

Constraints with manual tendering system and how to resolve through transformation

ETS was brought into operation on 7 April 2000 to handle tender value below HK$10 million. GO-Business is the exclusive service provider for operating and maintaining the system as well as supplier recruitment and registration. Through the joint effort between the two parties, ETS has successfully attracted more than 1,900 suppliers to register as subscribers by end of April 2002 with more than 2,513 tenders issued. The government has set a target to carry out 80% of public procurement tenders through electronic means by end-2003.

Traditional tendering process involves a large amount of paper work spanning multiple departments across government organizations. More than often, these activities can be a burden to repetitive purchasing for most departments. This is why ETS was introduced to streamline the way tendering is being conducted, saving both time and cost for GSD and other government organizations with a more effective way to acquire goods and services from external suppliers. ETS solves this problem via state-of-the-art technologies in both channel available – the Internet, to provide a platform for document interchange between suppliers and the enterprises.

ETS is preferable to GSD suppliers. Under traditional system, tender notices are available on the Internet for viewing only. If suppliers are interested in a particular tender, they need to obtain the tender documents from the Procurement Division of GSD or need to wait for tender documents sent by mail. This may delay the starting time of tender preparation.

During the tender preparation, repetitive re-keying work and printing/binding tasks involved unexpected administrative cost and waste of staff time. These type of work are time-consuming and non value-added. Binding of numerous tender documents copies may cause the suppliers excess administrative or monetary cost.

Under manual process, tenderers have to deposit tenders into the tender box located at GSD office physically, resulting in transportation cost and risk of late tender arising from frequent traffic jams in Hong Kong. Tender boxes would only be accessible during office hours and tenderers are unable to submit tenders outside operating hours.

In addition, many overseas suppliers find it difficult to obtain tender documents and deposit tenders into tender box. As a result, it will restrict GSD to receive competitive offers proposed outside Hong Kong.

ETS was introduced to address the above issues through state-of-the-art technology. Operated on a web-based environment, ETS transformed the traditional tendering process for both government and its suppliers, achieving higher efficiency and effectiveness.

Benefits to GSD through Transformation

Through the Internet-based ETS, GSD could rapidly expand its potential supplier pool and thus create a much more competitive environment. As a result, GSD would be able to receive more competitive offers and more choices. ETS could effectively assist GSD to reduce paper wastage in printing large volume of paper-based tender documents to be collected by suppliers. Furthermore, ETS has brought in many new suppliers (both local and overseas) who had not participated in GSD tenders when only paper-based methods were available.

In addition, ETS is able to provide GSD with a channel to publish its Tender policy online. It enables the publishing of general terms and conditions but highlight only specific terms of each tender. ETS could also integrate with GSD's backend procurement management system (PMS) to improve productivity and reduce administrative work so that purchasing staff could focus on high value-added tasks like negotiation with vendors.

Benefits to the Supplier Community through Transformation

ETS dramatically shortens suppliers' time and cost in bid preparation and submission. Based on GSD's estimation, it takes 3 days and 31 minutes respectively through courier and fax sending a 42-page document from Ottawa to Hong Kong which costs around US$30 and US$4 respectively. While the document is sent via Internet, it takes only 2 minutes at US$0.11 which means a 2,160 times faster and over 270 times cheaper when submitting documents through ETS comparing with courier.

ETS also allows round the clock service available online at all time. Suppliers could access tender documents in electronic forms which facilitate tender preparation, thus saving the time in receiving tender notices and submitting bids. No business opportunities would be missed through "Tender Opportunity Matching Service" for tender notice. On the other hand, tender barriers would be removed in which local and overseas suppliers would be able to register as subscribers and perform the registration, tender submission and other related activities any time.

Value-added services have been provided for ETS suppliers in using the system. Personalized e-mail notifications will disseminate the latest tender information and minimize the risk of missing business opportunities. Suppliers could customize their e-mail notifications by selecting the criteria for the kind of tender notices they wish to receive. The outsourced service provider also offers value-added services like Bizchedule, a comprehensive online virtual office, to facilitate suppliers in managing their tender activities. This service helps suppliers to keep their business appointments, calendar, and to find out the details of the latest industry events. Suppliers could record key events such as availability of new tenders and tender closing time on users' calendar to avoid overlook of tender opportunity.

The enhancement of ETS in November 2002 provides suppliers with additional features such as the ability to store the data input in tender offer submission screen so that users could later retrieve for future processing. Another feature is that it enables users to select whether to download the full set of tender document at one time or in multiple parts. Last but not the least, the enhanced version allows the upload of tender proposals to resume automatically after disruption caused by Internet disconnection. .

Secure to trade through the Net?

ETS is built and operated on a secured open platform for e-business applications, enterprise-wide infrastructure and security platform. End-users will be able to access the system via widely available Internet Explorer Browser without the need to install any software.

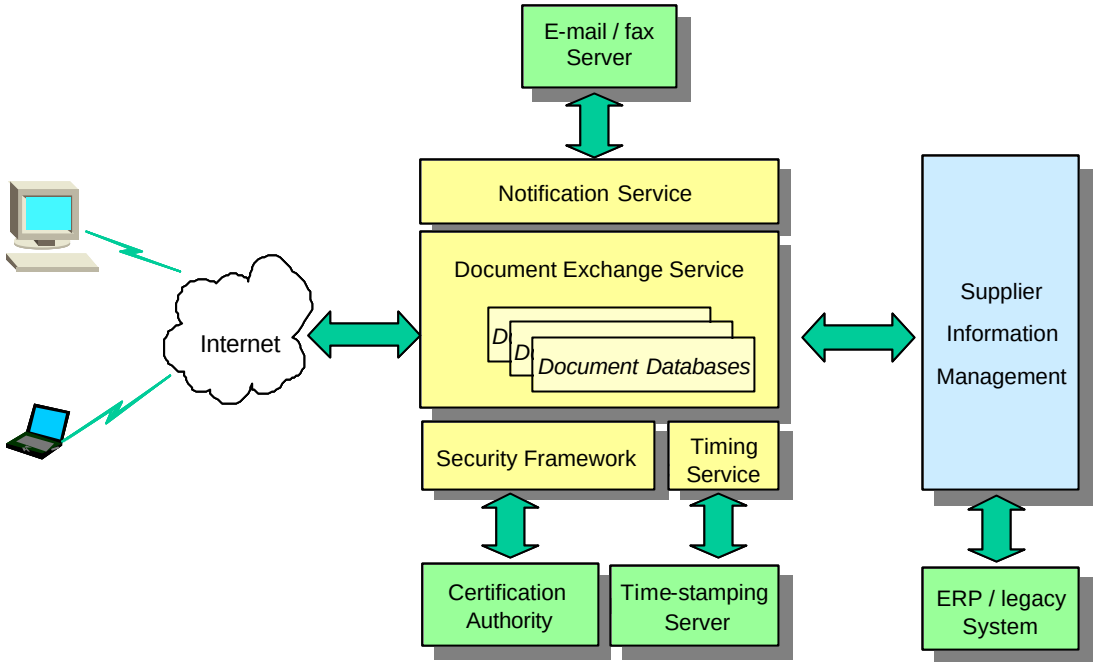


Fig 4 ETS Architecture Overview

Security is the key to ETS. ETS makes use of a combination of security technologies and concepts to construct the framework of the security architecture.

Security can be categorized into 5 layers:

Table 1 Security Layers

Layer	Description
Operation	Security measures can be deployed successfully only with proper operational policy and procedures.
Application	Layer for the ETS business process, in which a balanced solution between usability and security control should be made.
System	The most frequent access layer from operators and administrators.
Network	The first layer of defense against security threats of hackers originated from the Internet.
Physical	The first layer of defense against security threats from internal access.

Operation and Physical Security

As Operation and Physical security are related to the operation procedure of GSD's system operation, we will focus on the Application, System and Network security aspects in this session.

Application Security

The following diagram depicts the application security framework of ETS.

The system makes use of the following technologies in constructing the application security framework:

Table 2 Application Security Frameworks

	Suppliers	ETS
Privacy	**Strong File Encryption** ← **SSL** →	**Strong File Encryption**
Authentication	**User Account** **Digital Certificate (iCert)** **Digital Signature**	**User Account** **Optional: Fingerprint Identification**
Integrity	**Checksum** **(Hash Value)**	**Checksum** **(Hash Value)**
Submission Record	**Encrypted File** **Acknowledge Receipt with Time Stamping and Hash Value**	**Electronic Tender Box** **(Encrypted until closing time and decrypted by Procurer private key)**

To ensure data confidentiality during transmission over the HTTP protocol, Secure Socket Layer (SSL) technology is applied. Login ID / Password serves as the basic requirements for access control to ensure the identity of the logged in user. The system makes use of the industry standard Public Key Infrastructure (PKI) for suppliers authentication. Suppliers are required to apply eCert during registration for generating the digital signature to present their identity during offer submission. Upon transmission through the Internet, the system will perform a hashing process to produce the hash value in ensuring the integrity of tender offer. Asymmetric encryption based on RSA algorithm is used for the encryption of the tender offer documents. Only that procurer who owns the public key can decrypt the content of the submitted offer during tender box opening. Should the procurer need to authenticate the tender box opening personnel's identity, fingerprint verification could also be adopted.

System Security

System security consists of Server access and Database access security.

- Server Security

Server access security is controlled by the Windows NT server access control which is user ID/password based. The NT server can have only one account "Administrator" in order to simplify the administration and avoid security exposure due to the presence of application specific NT accounts in the server.

To further enhance the server access security, a fingerprint identification device could be installed in the server to verify authorized users to the system.

- Database Security

Database security is controlled by the built-in security mechanism of SQL Server, which is also user ID/password based. In the database, access authority is segregated into different accounts based on their roles.

ETS makes use of a less powerful "Data Owner" account to access the data in the SQL Server. The advantage of this approach is that the SA password will not be required for the day-to-day system operation. The SA password can be kept by an independent party to ensure security to the database.

Network Security

The design for the network secure infrastructure of the system composes of 3 major zones, they are:

- Public Internet Zone
- Demilitarized Zone – For controlled access
- Private Zone – For Internal access only

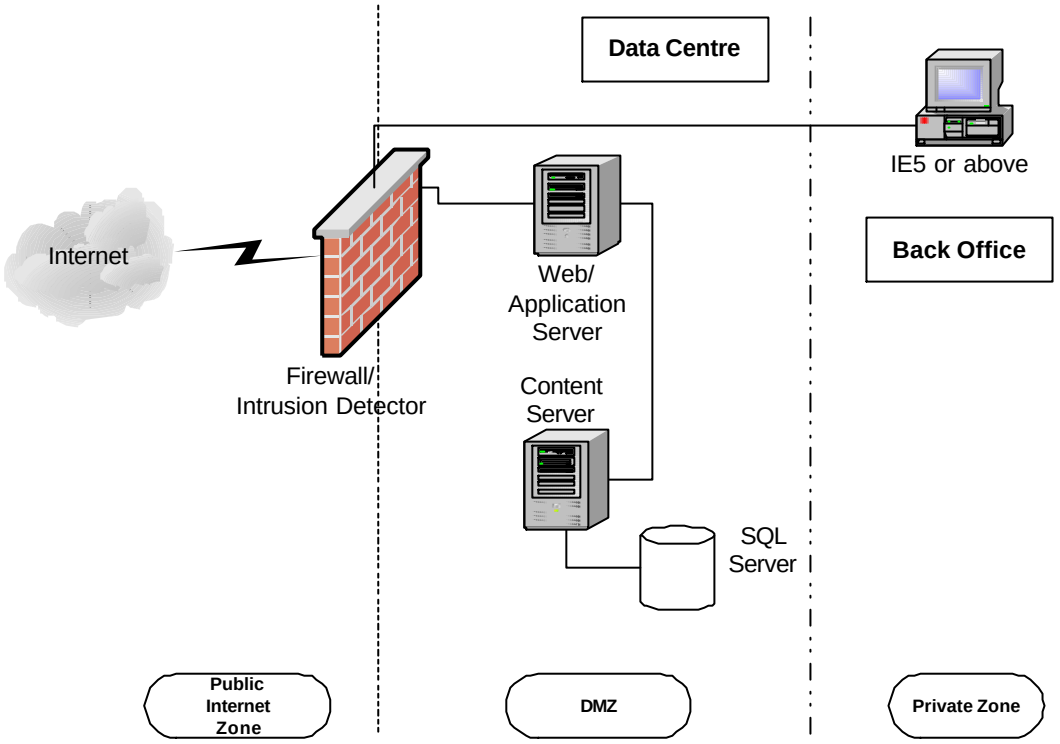


Fig 5 Network Security Diagram

- Public Internet Zone

The Public Internet Zone refers to the Internet area, where the Public Internet Users access to the ETS.

- Demilitarized Zone

This is an area that contains servers where users from the Internet can directly access. It contains the web/application server for serving the HTTP requests from users. Security control is particularly important in this zone as it is directly interfaced to the Public Internet Zone.

- Private Zone

This area contains servers where no direct access is allowed from the public Internet. Most of the services provided here are accessible by the web servers only. This area also provides services for internal users to access the ETS in a controlled and secured way.

Demilitarized Zone' s (High Risk Zone) Infrastructure

The proposed secure infrastructure addresses the network security requirement as follows:

- First Tier Security with Intrusion Detection Solution

In order for the whole firewall solution to be completed, the intrusion detection system is deployed at the public Internet zone. Since firewall is not natively designed for intrusion detection, it can only handles four types of intrusion, which are far from enough.

An Intrusion Detection System (IDS) captures network traffic and interprets attacking patterns based on the database. If IDS find any abnormal network activity on the network, it does not only block the connection to prevent further attack but also informs system administrator in form of alerts.

With ISS RealSecure Network Sensor deployed before DMZ, system user can monitor network packets and look for signatures that could indicate an attack against your network. On the other hand, the RealSecure Workgroup Manager, a monitor console, can be used as the central management point for the network sensor.

Another consideration is the upgrade path. With ISS RealSecure version, it continues to enhance its family of products, with independently licensed modules that can be purchased and deployed as needed.

- Second Tier Security Solution with Firewall

A firewall is placed between the un-trusted network, (i.e. the Public Internet Zone and the Demilitarized Zone) and the trusted network (i.e. the Private Zone). The firewall is hosted on a single computer that controls all traffic traveling between two networks and examines content as it passes through the firewall. This examination is on inbound, outbound, and/or bi-directional traffic. Examination of the traffic content is based on a set of rules. Firewalls allow an administrator to create rules that specify the actions to be taken by the firewall on every packet it receives. These actions can include:

- User Authentication

Access Control - Accepting the packet and forwarding it to the appropriate destination
Network Address Translation.

- Content Security

In this area, CheckPoint Firewall-1 is proposed for its recognized technologies on the IT market. Checkpoint Firewall-1 enables enterprises to define and enforce a single, comprehensive Security Policy that protects all network resources. Its patented Stateful Inspection Technology and the Open Platform for Security (OPSEC™) deliver a highly scalable solution that is able to integrate and centrally manage all aspects of network security, including third-party security applications, services and platforms. A family of add-on modules extends FireWall-1' s capabilities to all levels of security and management.

Besides, CheckPoint Firewall-1 is much more than just a firewall. It interoperates with multiple applications and supports a variety of functional modules to provide the industry' s only solution for Secure Virtual Networking, including an optional StoneBeat solution that can allow extra firewall node to be added to the cluster unit online. It can scale up to maximum 16 nodes to provide load-balancing function and deliver a fault tolerant security solution by having a recovery clustering node. Each of the firewall nodes should have the Ethernet interfaces as follows:

Table 3 Ethernet Interfaces in Firewall Nodes

Interface 1	Gateway to the Internet for browsing and transaction
Interface 2	Connected to the DMZ Web servers farm
Interface 3	Connected to the Private Zone

To protect the system from virus problems, an anti-virus & anti-vandal gateway software, NAI VirusScan Security Suite is deployed. It is designed to provide protection against malicious content such as viruses, vandals (malicious Java and ActiveX), data exposure, and other inappropriate content.

Conclusion

The World Trade Organization (WTO) is actively advocating public tendering to promote fairer trade among member countries. ETS is the first service for government purchasing organizations to use electronic tendering on such a large scale for the receipt of tender bids as well as for the distribution of tender documentation. It will encourage a competitive trading environment and hence foster the growth of industries in Hong Kong.

To summarise, GSD has successfully through ETS transformed the traditional paper-based tendering process to a robust and highly secured Government-to-Business (G2B) e-commerce application platform. This will have a strong impact on other local or regional government departments, quasi-government organizations and commercial sector to follow suit and enhance e-commerce adoption in the Asia Pacific, particularly in the electronic procurement and supply chain management areas.

The key issues in this transformation process are summarised as follows:

- ETS transforms the way of supplier sourcing. The supplier recruitment process is outsourced to a third party;
- Before implementation, it requires the re-engineering of existing procurement and tendering process adopted by GSD;
- ETS changes the way of suppliers in doing business. Instead of "knocking the door", they are able to make use of e-commerce to widen their business opportunities irrespective of boundary limits;
- To adapt the new technology and reduce resistance of users, GSD and its outsourced service provider carries out a series of user training and education in joint effort;
- Third party auditing of the technical infrastructure and use of the state-of-the-art technology overcome user's worry of online transaction security.

ETS is successful by the fact that it was firstly introduced to handle non-works tenders with contract value below HK$10 million. After the system enhancement in October 2001, ETS was extended to support GSD originated CTB tenders with value over HK$10 million. There are also plans in the Government to further enlarge ETS' s coverage to include small amount tenders posted by individual departments in the near future.

The Works Tenders are handled separately by the Works Departments under the auspices of the Works Bureau. After the construction industry study conducted by the Construction Industry Review Committee (CIRC) in 2001, one recommendation was to use IT in improving the construction efficiency through better information flow among project participants. Electronic tendering of Works Contracts was one of the examples in achieving electronic collaboration between the Works Bureau and its business partners. Electronic Tendering has been carried out in stages with tender issue and offer receipt through CD-ROM implemented as the first stage. In late 2001, tender documents have also been disseminated through the Internet via service provider. The next stage would be the complete use of e-tendering for Works Projects Tender scheduled before mid-2003.

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