

**MASTER SERVICES AGREEMENT**

between

**THE STATE OF TEXAS, ACTING BY AND THROUGH  
THE TEXAS DEPARTMENT OF INFORMATION RESOURCES**

and

**INTERNATIONAL BUSINESS MACHINES CORPORATION**

**DATED FEBRUARY 24, 2010**

**EXHIBIT 8**

**TECHNOLOGY ARCHITECTURE AND STANDARDS**

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## **1.0 ENTERPRISE ARCHITECTURE**

This Section describes the current state of the enterprise architecture across all State agencies on the Effective Date.

Enterprise architecture is a comprehensive approach used to manage and coordinate an organization's business processes with its information systems, such that they align with the organization's core goals and strategic direction.

Enterprise architecture collectively refers to both business architecture and technical architecture, and the relationships between them that demonstrate alignment.

While there are State standards, guidelines and policies, the State does not require a uniform enterprise architecture across all State agencies, and there are currently few statewide architectural standards for either business or technical architecture. Historically, each agency has developed a unique enterprise architecture, which may vary in terms of documentation and maturity.

Some agencies have well-developed and well-documented technical architecture, but poorly documented business architecture, or vice versa. Or in many cases, there are well-developed and well-documented business and technical architectures, but they are not well aligned, and the relationships between them are undocumented or poorly understood.

The stated objective in the Strategic Plan with regard to enterprise architecture is to encourage agency-specific business and technology architectures that drive improved planning and coordination. To that end, DIR has articulated the following strategies:

- Support the development of agency architectures
- Incorporate technology reuse into agency architectures
- Align common aspects of agency architectures

Section 10.0 of this Exhibit describes the State's existing efforts to develop and implement State-wide architectural standards.

## **2.0 TECHNICAL (IT) ARCHITECTURE**

State agencies implemented their IT infrastructures based on individual agency needs. Server architecture varies from Wintel 386 technology to the latest in grid server technology. The same is true for the mainframe environment. Within the same agency, leading edge technologies exist side by side with technology that is no longer supported by the original vendor.

State agencies have been implementing web services architecture, directly supportive of the goals and objectives of the State. The State is becoming a highly interconnected

governmental enterprise, providing constituents access to State government information and services (e.g., Texas Online).

Interconnecting this movement to online access is a highly reliable, high bandwidth network, essential for the success of any technology-enabled enterprise. Users, whether they are constituents, employees, vendors or partners expect to be able to access services anytime with the security, reliability, and response-time necessary.

The State must be capable of deploying cutting-edge technologies, yet maintain crucial operations on older technologies. The State's goal is to make world-class services accessible to the citizens and employees of Texas, and to migrate from older IT architectures to newer ones.

Technical architecture standards are critical for deployment and alignment between business and service enhancing technologies. While enterprise architecture standards, policies, and rules have not yet been defined for the State, basic technical standards do exist at the State-wide level. These technical standards are currently set forth in the "State Agency Checklist based on the Texas Administrative Code (TAC) Title 1 Administration Part 10 Department of Information Resources and the Information Resources Management Act (IRMA)."

As of the Effective Date, the State's IT architecture is comprised of many interrelated components including:

- Internet, file, print, electronic mail, and scheduling services
- Computer Infrastructure (Mainframe, Servers, Desktops, etc.)
- Associated System Software Platforms (e.g., Windows, Novell, UNIX, MVS)
- Applications and DBMS (e.g., Oracle, MSSQL, DB2)
- Enterprise Network, including a statewide WAN, Austin-area MAN, and high bandwidth Internet access
- Agencies' Local Area Networks (LANs) supporting workstation access to the computer infrastructure and the enterprise network
- Remote access services
- Data backup and recovery services

### **3.0 AGENCY-SPECIFIC APPLICATIONS**

Each State agency has a broad and diverse landscape of applications. There are approximately one thousand eight hundred fifty (1,850) different applications in use throughout the State, with a licensing base of greater than two hundred thousand

(200,000) seats. The State does not currently mandate uniform standards for application selection or development. Applications fall into the following categories:

- Commercial off-the-shelf (COTS) packages – non-customized
- Commercial off-the-shelf (COTS) packages – customized
- Custom-developed applications – outsourced
- Custom-developed applications – in-house development

Agency-specific applications are maintained and supported by the applicable agencies, either internally or via vendor contract. The applications are currently stored and executed on a broad range of platforms, including IBM Mainframes, Unisys Mainframes, Midrange Computers (e.g., IBM/AIX, HP/UX, Sun/Solaris, IBM/AS400), and Servers (Windows, Novell, Linux).

#### **4.0 ENTERPRISE APPLICATIONS**

Enterprise applications are those applications which solve a common business problem, and which are implemented centrally to serve the needs of two or more agencies. Enterprise applications are currently in use primarily at the statewide infrastructure level. As an example, Texas Online is currently utilized by multiple agencies for a unified presentation to the citizens of the State. The Health and Human Services Commission utilizes common financial and human resources systems.

#### **5.0 WIDE AREA NETWORK (WAN)**

This Section describes current and future WAN architecture standards and environments used throughout the State. While the WAN is not In-Scope, it is considered a critical component of the infrastructure necessary for delivery of the Services.

Sixteen (16) separate agency WANs connect more than one hundred thirty thousand (130,000) devices at four thousand, four hundred thirty-one (4,431) different locations. One hundred twenty-four (124) full time staff support and maintain these networks. Most agencies have standardized on IP as their transport protocol. DIR provides the network and transport services for these agency WANs through its telecommunications services offerings, namely TEX-AN (Texas Agency Network), the DIR WAN, and the Austin MAN. AT&T provides telecommunications services for TEX-AN; AT&T's network operates on a FR/ATM platform. Agencies connect to the network cloud via various protocols (FR, ATM, HDLC, and PPP).

The Austin MAN is a SONET infrastructure providing network communications to agencies in the Austin area. This network also serves as the State-wide gateway for Internet access.

Agency connectivity to these DIR network services may be through FR, ATM, PPP, HDLC, or other protocols.

## 6.0 LOCAL AREA NETWORK (LAN)

The State Data Center and each of the DIR Customer Data Centers has agency specific LAN's. There are approximately twenty thousand (20,000) LAN internally attached devices across all such Data Centers. There are approximately eighty-five thousand (85,000) remotely attached LAN devices outside of such Data Centers. Service Provider shall provide remote Server management Services. Therefore, a listing of the Network Operating Systems (NOS) and protocols that are used for transmission of data over the network are provided as follows:

**Transmission Control Protocol (TCP)/Internet Protocol (IP):** These two protocols were created by the Defense Advanced Research Projects Agency (DARPA) to establish connectivity between heterogeneous computers in the department's network. This soon became the foundation for the World Wide Web, and is now also being used to support web services communication.

**Hypertext Transport Protocol (HTTP):** HTTP is the protocol of the Internet. HTTP runs on top of TCP/IP. HTTP has become the predominant protocol for Internet services, given the ubiquity of the protocol and the ability to navigate through firewalls.

**File Transfer Protocol (FTP):** FTP is used primarily for transfer of files between computers. Though FTP can be used for Internet services, it is not widely adopted yet.

**3270 Protocol:** 3270 Protocol is a protocol set-up to communicate to IBM/Unisys mainframe environments, which may include VM/CMS, MVS/TSO, ROSCOE, and CICS.

**Simple Mail Transport Protocol (SMTP):** SMTP is the standard for exchange of email between servers.

**Inter-network Packet Exchange (IPX):** IPX is a networking protocol used by the Novell NetWare operating systems. IPX is a datagram protocol used for connectionless communications. IPX and SPX are derived from Xerox Network Services' IDP and SPP protocols.

**Post Office Protocol (POP) and/or Internet Mail Access Protocol (IMAP):** POP is an Internet email server protocol that provides an incoming email message storage system. It works in conjunction with the SMTP (Simple Mail Transfer Protocol), which provides the message transport services required to move email from one system to another. IMAP is an Internet protocol that allows a client to manipulate email messages that are stored on an email server. IMAP is similar to POP (Post Office Protocol), but has new features.

**Multipurpose Internet Mail Extensions (MIME):** MIME allows for attaching non-text files to standard email messages. Non-text files include graphics, spreadsheets, formatted word-processor documents, and sound files.

**Novell Netware:** The NetWare operating system supports the networking of personal computers (PCs). Installed on a PC, NetWare creates a server environment for the sharing of files, printers, and other network services.

**Microsoft Networking:** In Microsoft networking, a workgroup is a collection of computers on a LAN that share common resources and responsibilities. The Microsoft Windows family of system software supports assigning of personal computers to named workgroups and domains.

## 7.0 SERVER

The State has a very diverse server environment, ranging from larger partitioned mid-range servers to single application servers. Many of these servers provide mission critical applications including administrative systems that support day to day agency operations.

Server vendors are adapting their business strategy to focus on real time exchange of information on enterprise networks and the Internet. Network storage systems are adapting to the Internet. Core elements of server strategic business strategy include provision for end-to-end architecture that extends technology across scalable processor architectures. State agencies are selecting server products that are positioned to provide price-performance, flexibility, and portability. Clustered systems are a significant aspect of the agencies' plans.

On-going innovation in microprocessor architecture, systems design, networking integration, and networking software will help to ensure the continuing evolution of server technology. As server refreshes occur, the agencies want to take advantage of the latest technologies as a result of this evolution. The State wants to continue to achieve a server price-performance advantage that it enjoys today. To that end, the State will continue to seek servers that work together with a combination of software, hardware and services that deliver high customer value. The State will also demand server platforms that are positioned to lower administrative costs, lower developer training costs, provide higher availability, and provide higher reliability.

## 8.0 MAINFRAME

The current mainframe environment consists of fifteen (15) IBM mainframes and one Unisys mainframe supporting ten (10) agencies. There are no current State-wide mainframe standards.

## **9.0 PRINT/MAIL**

The current print environment is decentralized and is centered on individual agencies peak scheduling periods. As a result equipment utilization is high only for short periods of time in a 24 x 7 operational timeframe. Mail operations may be handled by individual agencies or through the Comptroller of Public Accounts. There are multiple metering machines, sorting equipment, and inserting equipment spread across the agencies. Inefficiencies and lost opportunity costs exist due to this dispersed environment.

## **10.0 STRATEGIC DIRECTION FOR ARCHITECTURES AND STANDARDS**

Much of the strategic direction for State architectures and related standards is described in the Strategic Plan. DIR will work with State agencies as described in the Strategic Plan to establish standards and policies for business, technology and information architectures.

DIR will work with Service Provider through the Data Center Services Technical Steering Committee described in **Exhibit 6** to determine how evolving State architectural and technology standards and policies will be applied to the Data Centers and the Services, and to identify opportunities and input from Service Provider supporting the development of the evolving architectural standards.