F. Test Results: Electronic Communications Trouble Administration Capacity Management Evaluation (M&R-6)

1.0 Description

The Electronic Communications Trouble Administration (ECTA) Capacity Management Evaluation entailed a detailed review of the methods and procedures in place to plan for and manage projected growth in the use of the ECTA interface. The objective of this evaluation was to determine the extent to which methods and procedures to accommodate future increases in ECTA system transaction volumes and users are being actively managed.

2.0 Methodology

This section summarizes the test methodology.

2.1 Business Process Description

See Section VII, "Maintenance & Repair Overview" for a complete description of the ECTA environment and the downstream systems accessed by ECTA.

ECTA systems operate in a midrange environment. BellSouth has outsourced midrange operations and application support. The Midrange Operations Group manages the hardware, and the Application Support Team manages the software for ECTA. The BellSouth Transport Organization manages the day-to-day operations of the networks and collects data on network performance.

2.2 Scenarios

Scenarios were not applicable to this test.

2.3 Test Targets & Measures

The test target was the systems capacity management process for ECTA. Sub-processes, functions, and evaluation criteria are summarized in the following table. The last column "Test Cross-Reference" indicates where the particular measures are addressed in section 3.1 "Results & Analysis."

Table VII-6.1: Test Target Cross-Reference

Sub-Process	Function	Evaluation Criteria	Test Cross-Reference
ECTA Capacity Management	Data collection and reporting of business volumes, resource utilization, and performance monitoring	Adequacy and completeness of data collection and reporting	M&R-6-1-1 M&R-6-1-2 M&R-6-1-3 M&R-6-1-4 M&R-6-1-5 M&R-6-1-6
	Data verification and analysis of business volumes, resource utilization, and performance monitoring	Adequacy and completeness of data verification and analysis	M&R-6-1-7 M&R-6-1-8 M&R-6-1-9 M&R-6-1-10 M&R-6-1-11
	Systems and capacity planning	Adequacy and completeness of systems and capacity planning	M&R-6-1-12 M&R-6-1-13 M&R-6-1-14 M&R-6-1-15

2.4 Data Sources

The data collected for the test are summarized in the table below.

Table VII-6.2: Data Sources for ECTA Capacity Management Evaluation

Document	File Name	Location in Work Papers	Source
Electronic Communications Trouble Administration (ECTA) Release 5.0 Requirements Specifications	No electronic copy	M&R-6-A-1	BLS
ECTA Usage Report	Usage~1.xls	M&R-6-A-2	BLS
Interview Summary, November 3, 1999	Interview Summary_110399.doc	M&R-5-A-6	KCI
Joint Implementation Agreement (JIA) for Electronic Communications Trouble Administration (ECTA) Gateway for Local Service between CLEC and BellSouth **Draft**	Clec_jia.zip	M&R-6-A-3	BLS
BellSouth Telecommunications Information Technology – Capacity Planning Methodology, Practices and Requirements – July, 1999	Cap_methodology.doc	PRE-6-A-1	BLS
Interview Summary – BCS Transport	Interview_summary_121599.doc	PRE-6-A-2	KCI

Document	File Name	Location in Work Papers	Source
BOSIP Network Diagrams	Atlntadc.ppt Bosipcor.ppt Brmghmdc.ppt Chrltdc.ppt Jcksondc.ppt Miamidc.ppt Nsvlledc.ppt	PRE6-A-3	BLS
Birmingham BayNet Protocol Distribution	Bay1.gif	PRE-6-A-4	BLS
Monthly Average Utilization - Birmingham	FDDI1.gif	PRE-6-A-5	BLS
LAN Interface With In Utilization over 20%	LAN~1.htm	PRE-6-A-6	BLS
Average Latency Between RDC's Originating from Birmingham	Monthl~1.gif	PRE-6-A-7	BLS
Monthly Maximum IP Routes Known to Core	Monthl~2.gif	PRE-6-A-8	BLS
WAN Interface With In Utilization over 30%	SMDS1.gif	PRE-6-A-9	BLS
Daily Interface Performance Statistics for PNSCGS04 to JCVLBA19	Pnscgs04.gif	PRE-6-A-10	BLS
Total Traffic Across Core	WAN~1.htm	PRE-6-A-11	BLS
Server Utilization Report	Viewar~1.csv	PRE-6-A-12	BLS
Interview Summary – Transport Solutions	Interview_summary1_ 121099.doc	PRE-6-A-13	KCI
Interview Summary – Asset Planing	Interview_summary1_ 01202000.doc	PRE-6-A-14	KCI
BSCN – DS3 Equivalent Capacity	Bscncap.ppt	PRE-6-A-15	BLS
BellSouth Official Communications Special Services Facility Forecast for 2000 – 2002 and Update to the 1999 Forecast (Cover Letter)	Ss99ltr.doc	PRE-6-A-16	BLS
BellSouth Telecommunications Official Communications Service Requirements And Special Service Forecast	Bscn1999.doc	PRE-6-A-17	BLS
Capacity Planning Metrics for BST Assets Managed by BCS	Capaci~1.doc	PRE-6-A-18	BLS
BellSouth Telecommunications Official Communications Service Requirements Mechanized Input Form	Bscnele.xls	PRE-6-A-19	BLS

Document	File Name	Location in Work Papers	Source
Trunk Utilization Report	Rpdn_0110.doc	PRE-6-A-20	BLS
BellSouth Integrated Broadband Network Diagram	Ibtcp911.ppt	PRE-6-A-22	BLS
Transport Asset Planning – Infrastructures	Infraex.ppt	PRE-6-A-23	BLS
Interview Summary – Network Asset Planner	Interview_summary2_01202000.doc	PRE-6-A-24	BLS
Questionnaire designed to aid Capacity Planner and / or Technical Architect in characterizing an application workload	Config.xls	PRE-6-A-25	BLS
Interview Summary – Midrange Performance Monitoring	Interview_summary_01252000.doc	PRE-6-A-26	BLS
Data Collected 11 / 19 / 99 – (Status Report, by project, of Midrange data collection tool installation)	Perforn1.doc	PRE-6-A-29	BLS
Printouts from Midrange Performance Data Warehouse	No Electronic Copy	PRE-6-A-27	BLS
BGSCOLL Problem Resolution Guide for Collection of Nodes	Probres.doc	PRE-6-A-28	BLS
Interview Summary – Capacity Planner	Interview_summary_01272000.doc	PRE-6-A-30	KCI
BOSIP Support Web Site Printouts – Homepage	No Electronic Copy	PRE-6-A-39	BLS
BOSIP Support Web Site Printouts – Shared BOSIP Network	No Electronic Copy	PRE-6-A-40	BLS
BOSIP Support Web Site Printouts – BCS Support	No Electronic Copy	PRE-6-A-41	BLS
BOSIP LAN and WAN Network Topology Overview	No Electronic Copy	PRE-6-A-42	BLS
Datakit Support Homepage and affiliated web pages	No Electronic Copy	PRE-6-A-43	BLS
TRENDview HTML Reports	No Electronic Copy	PRE-6-A-45	BLS
TRENDview HTML Reports – Overutilized / Underutilized WAN Interfaces	No Electronic Copy	PRE-6-A-46	BLS
TRENDview HTML Reports – WAN interface utilization graphed over time	No Electronic Copy	PRE-6-A-47	BLS
Printouts from EDS Midrange Performance Data Warehouse Web Site	No Electronic Copy	PRE-6-A-48	BLS

Document	File Name	Location in Work Papers	Source
Project List	No Electronic Copy	PRE-6-A-49	BLS
ELBO Performance Data	No Electronic Copy	PRE-6-A-50	BLS
LMOS Performance Data	No Electronic Copy	PRE-6-A-53	BLS
Capacity Planning & Management Playbook (What we do & How we do it) Working Draft – Not Approved	No Electronic Copy	O&P-6-C-1	BLS
Critical Application Availability (Andersen & EDS)	KCIdata.xls	BLG-3-A-34	BLS
Application Availability	GA2000SLAs.xls	BLG-3-A-35	BLS
Memorandum to EDS Centralized System Administrators re: BTSI Capacity Planning	CSA Performance Letter.doc	PRE-6-C-20	BLS
BTSI Capacity Upgrade Request / EDS Performance Analysis Workflow	BTSI Performance Process.doc	PRE-6-C-21	BLS
Project Charter: Encore SLA Performance	ProjCharter063000.doc	PRE-6-C-22	BLS
Memo to Capacity Planners re: CLEC SQM Performance information availability via the PMAP website	CapPlanmemo0700.doc	PRE-6-C-23	BLS
Capacity Management Analysis	Analysis of recent docs for Cap mgmt.doc	PRE-6-A-71	BLS
Billing Tower Interim Procedures	Critic~11.doc	PRE-6-A-72	BLS
Capacity Planning and Management Standard Operating Procedures	F-1-5 Capacity Plan.doc	PRE-6-A-74	BLS

2.4.1 Data Generation/Volumes

This test relied on documentation reviews and interviews with BellSouth personnel.

2.5 Evaluation Methods

The ECTA Capacity Management Evaluation began with a review of systems documentation and process flows for maintenance and repair activities. Interviews were conducted with key system administration personnel responsible for the operation of the ECTA system. These interviews were supplemented with an analysis of BellSouth's documented capacity management procedures as well as with collection of evidence of related

activities such as periodic capacity management reviews, system reconfiguration / load balancing, and load increase induced upgrades.

2.6 Analysis Methods

The ECTA Capacity Management Evaluation included a checklist of evaluation criteria developed by KCI during the initial phase of the BellSouth - Georgia OSS Evaluation. These evaluation criteria provided the framework of norms, standards, and guidelines for the ECTA Capacity Management Evaluation.

The data collected from documentation reviews and interviews were analyzed employing the evaluation criteria referenced above.

3.0 Results Summary

This section identifies the evaluation criteria and test results.

3.1 Results & Analysis

The results of this test are presented in the table below. Definitions of evaluation criteria, possible results, and exceptions are provided in Section II.

Table VII-6.3: M&R6 Evaluation Criteria and Results

Test Cross-Reference	Evaluation Criteria	Result	Comments
M&R-6-1-1	There is an established process for capturing business and transaction volumes	Satisfied	ECTA transactions are tracked daily and reported year-to-date. The ECTA hardware platform is monitored for transaction volume. ECTA reports are produced and monitored monthly. The ECTA system is currently used by only one CLEC and generates approximately 300 transactions per month. The tracking process was described during the ECTA project manager interview. KCI was provided a copy of the ECTA Usage report.
M&R-6-1-2	There is an established process for capturing resource utilization	Satisfied	ECTA runs on midrange processors. The Midrange Operations Group produces monthly reports on system resource utilization. The data collected to produce system resource utilization reports are maintained on their respective hardware platforms and are also downloaded to a personal computer system for further analysis. Tools and utilities run in the midrange environment to track and report resource utilization. BLS manages the network infrastructure and uses tools to collect and report utilization of network resources. Resource utilization data is reported on the BellSouth Open System Interconnect Protocol (BOSIP) home page and the Midrange Performance Monitoring Web site. These Web sites

Test Cross-Reference	Evaluation Criteria	Result	Comments
			are available to, and accessed by, the personnel responsible for monitoring the performance of systems and networks. The processes for capturing resource utilization were described during interviews with members of the groups responsible for these activities. In addition, KCI reviewed the BOSIP home page and the Midrange Performance Monitoring Web site. Sample resource utilization reports were collected and reviewed.
M&R-6-1-3	Resource utilization is monitored for system components and elements	Satisfied	For midrange systems, resource utilization is tracked and reported for CPU utilization, Memory utilization, Disk Input/Output (I/O), Network I/O, and file system utilization as evidenced by sample reports collected during a review of the Midrange Performance Monitoring Web site. Resource utilization data is collected for the CPU, buffer and memory utilization for the routers, circuits utilization of the routers, Wide Area Network(WAN), Local Area Network (LAN) interfaces on routers, hubs and the Fiber Distributed Data Interface (FDDI) rings. For the circuits and LAN interfaces, reports are generated for the devices with the highest utilization. The network resource utilization data collection process was described during interviews and verified through a review of the BOSIP home page and through the collection of sample reports.
M&R-6-1-4	Instrumentation and other tools are used to collect resource utilization data	Satisfied	The data used to produce system resource utilization reports are gathered through a variety of tools and utilities including Best/1, BGSCOLL, GlancePlus, System Activity Recorder (SAR), Unicenter TNG, and Tivoli. Reports from these tools are posted on the Midrange

Test Cross-Reference	Evaluation Criteria	Result	Comments
			Performance Monitoring Web site. Tools running to collect network resource utilization data include TRENDsnmp (from DeskTalk), Spectrum Enterprise Manager, OpenView, Nerve Center for BOSIP (the router network), and Starkeeper (for the Datakit networks). The tools used to collect resource utilization data were described during interviews with the ECTA project manager, Midrange Operations Group, and Network Support Team.
M&R-6-1-5	Performance is monitored at all applicable levels (e.g. network, database server, application server, client, etc.)	Satisfied	The Midrange Operations Group monitors the performance of the application servers. The BLS Transport Team is responsible for day-to-day operations of the networks (comprised of components such as routers, ATM switches, and hubs.). The team is comprised of three groups: Protocol Analysis and Communication Support (PACS), which provides support and problem resolution for escalated network performance issues; Proactive Performance Analysis, which looks at the networks to prevent problems; and the Tools Group. This team collects the data on network performance. BLS has also written scripts to collect data such as latency and packet loss across the BOSIP core. These activities were described during interviews with the ECTA project manager, Midrange Operations Group, and the Network Support Team. In addition, sample performance reports were collected.
M&R-6-1-6	Instrumentation and other tools are used to monitor performance	Satisfied	The BOSIP home page and the Midrange Performance Monitoring Web sites are available to and accessed by the personnel responsible for monitoring the performance of

Test Cross-Reference	Evaluation Criteria	Result	Comments
			systems and networks. Best / 1, GlancePlus, SAR, Unicenter TNG, and Tivoli are tools used to monitor midrange performance. TRENDsnmp (from DeskTalk), Spectrum Enterprise Manager, OpenView, Nerve Center for BOSIP (the router network), and Starkeeper (for the Datakit networks) are tools used to monitor network performance. Performance monitoring activities were described during interviews and sample reports were provided to KCI.
M&R-6-1-7	There is an established process for forecasting business volumes and transactions	Satisfied	During initial testing, no established, ongoing process for forecasting business volumes and transactions was observed for BLS's ECTA system. See Exception 25 for additional information on this issue. Retest activities revealed that the ECTA Joint Implementation Agreement (JIA) requests from the CLEC a forecast for the number of POTS and WFA Basic and Complex trouble reports per year. KCI found no evidence of a process for regularly collecting CLEC forecasting data; this exercise appears to be limited to the initial JIA. However, BLS has indicated that current ECTA transaction volume continues to be well below engineered system capacity, processes are established to monitor system performance, and triggers are in place to initiate capacity planning activities if system resource utilization increases. In addition, BLS developed an appendix to the *Capacity Planning & Management Playbook,* which describes an ongoing, annual forecasting process for ECTA. Exception 25 is closed.

Test Cross-Reference	Evaluation Criteria	Result	Comments
M&R-6-1-8	The business volume tracking and forecasting data is at an appropriate level of detail to use for capacity management	Satisfied	During initial testing, no established, ongoing process for forecasting business volumes and transactions was observed for BLS's ECTA system. See Exception 25 for additional information on this issue. Retest activities revealed that the ECTA JIA requests a CLEC forecast of POTS and WFA Basic and Complex trouble reports per year. This data could be used to predict future ECTA workload and should be adequate for capacity planning. Exception 25 is closed.
M&R-6-1-9	There is an established process for reviewing the performance of the business and transaction volume forecasting process	Satisfied	During initial testing, no established, ongoing process for forecasting business volumes and transactions was observed for BLS's ECTA system. See Exception 25 for additional information on this issue. BLS developed an appendix to the *Capacity Planning & Management Playbook* specifying that BTSI will track and compare actual ECTA transaction volume against the forecast volume. Current monthly ECTA transaction volume continues to be well below engineered system capacity, processes are established to monitor system performance, and triggers are in place to initiate capacity planning activities if system resource utilization increases. Exception 25 is closed.
M&R-6-1-10	There is an established process for verification and validation of performance data	Satisfied	Performance data are verified and validated by System Administrators and the Transport Group. Performance reports are reviewed regularly on the Midrange Performance Monitoring Web site, the BOSIP home page, and through on-line tools. The reports and tools define thresholds for utilization of system and network resources. Any values exceeding the established threshold are highlighted in the

Test Cross-Reference	Evaluation Criteria	Result	Comments
			reports, investigated, and resolved. Performance monitoring activities were described during interviews. KCI reviewed and collected sample performance and resource utilization reports.
M&R-6-1-11	Performance monitoring results are compared to service level agreements and other metrics	Satisfied	BLS and the third party managing the systems operations have contracts in place governing midrange system performance. These contracts define targets for system availability for ECTA. KCI was provided with the targets for system availability and copies of reports on vendor performance. Performance metrics for individual CLECs are defined in the Joint Implementation Agreements for ECTA, however, KCI did not have access to these contracts and cannot evaluate whether or not these measures are currently being fulfilled. Service Quality Measurements (SQM) are defined for availability of ECTA (OSS-3. Interface Availability [Maintenance & Repair]) and for transaction intervals (OSS-4. Response Interval [Maintenance & Repair]). Performance results for these metrics are reported through the Performance Monitoring and Analysis Platform (PMAP). (See *BellSouth Service Quality Measurements Plan* document dated 07/2000.) BLS's capacity planning process identifies PMAP data as input for the midrange capacity planning process. BLS monitors its own network performance results. Network availability (i.e., trunk and node availability) results are tracked against established performance targets/objectives. The Transport Group works with the BLS Architecture & Standards (A&S) Group to address any network performance issues. Network

Test Cross-Reference	Evaluation Criteria	Result	Comments
			performance activities were described during interviews with the BOSIP Support Manager.
M&R-6-1-12	Capacity Management process is defined and documented	Satisfied	The processes that are executed for performance monitoring and capacity planning activities are defined and documented. The document, *BLS Telecommunications Information Technology Capacity Planning Methodology, Practices, and Requirements July 1999*, outlines a capacity planning process for the mainframe, midrange, and network environments. BLS's capacity planning process is part of the IT Engagement Process (ITEP). Process flows for the capacity planning process have been developed and are posted on the BLS IT Web site. These flows are also contained in a document entitled *Capacity Planning & Management Playbook.* The capacity planning process has been communicated within the Engineering & Design Group. The links within the Asset Management Group and the interfaces to other organizations are defined in the process documentation. BLS is refining the definition of process links between the remaining functional groups. Documentation depicting the current mainframe performance monitoring process was provided to KCI. Midrange and network performance monitoring is addressed in the capacity planning and management documentation.

Test Cross-Reference	Evaluation Criteria	Result	Comments
M&R-6-1-13	Resource usage and capacity is considered in the planning process for capacity management	Satisfied	Midrange server utilization reports are examined on an ongoing basis and as part of the quarterly capacity planning process. LAN / WAN interface and FDDI utilization reports are examined on an ongoing basis as part of the network capacity planning process. These capacity planning activities were described during interviews.
M&R-6-1-14	Performance monitoring results are considered in the planning process for capacity management	Satisfied	Midrange performance monitoring reports are examined on an ongoing basis and as part of the quarterly capacity planning process. The BLS Architecture & Standards (A&S) Group is responsible for network capacity planning. The BLS Transport Team analyzes network performance data and resolves capacity issues. If unable to resolve capacity issues, the Transport Team alerts the A&S Group, which purchases equipment or makes architecture changes in order to increase or adjust system capacity. These capacity planning activities were described during interviews.
M&R-6-1-15	Capacity Management procedures define performance metrics to trigger the addition of capacity, load rebalancing or system tuning	Satisfied	Thresholds have been set for resource utilization and performance measures. Values that exceed the established thresholds are flagged and investigated. Procedures for performance management were described during interviews. In addition, KCI viewed and collected sample reports from the Midrange Performance Monitoring Web site and the BOSIP home page.