

E. Test Results: Trouble Analysis Facilitation Interface (TAFI) Capacity Management Evaluation (M&R-5)

1.0 Description

The Trouble Analysis Facilitation Interface (TAFI) Capacity Management Evaluation entailed a detailed review of BellSouth's methods and procedures in place to plan for and manage projected growth in the use of the TAFI interface. The objective of this evaluation was to determine the extent to which BellSouth methods and procedures to accommodate future increases in TAFI 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 TAFI environment and the downstream systems accessed by TAFI.

TAFI systems operate in a midrange computing environment. BellSouth has outsourced midrange operations and application support. The Midrange Operations Group manages the hardware consisting of a cluster of midrange servers for the Residential Retail Maintenance Center (RRMC), Business Retail Maintenance Center (BRMC), and the Competitive Local Exchange Carrier (CLEC) users. A project manager is assigned responsibility for TAFI software and system interfaces. The BellSouth Transport Organization manages the day-to-day operations for the networks and collects data on network performance. The BellSouth Architecture & Standards group is responsible for network capacity planning.

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 TAFI. 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-5.1: Test Target Cross-Reference

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

2.4 Data Sources

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

Table VII-5.2: Data Sources for TAFI Capacity Management Evaluation

Document	File Name	Location in Work Papers	Source
<i>Competitive Local Exchange Carrier (CLEC) Trouble Analysis Facilitation Interface (TAFI) Specifications</i>	TAFIspec.zip	M&R-5-A-1	BLS
NCR/SUN Platform TAFI Configuration	TAFI_cap.xls	M&R-5-A-2	BLS
CLEC TAFI Usage (1999)	USE_1999.xls	M&R-5-A-3	BLS
Cumulative Legacy Access Times for CLEC TAFI and BST TAFI	No Electronic Copy	M&R-5-A-4	BLS
CLEC TAFI Trouble Forecast	Forecast.xls	M&R-5-A-5	BLS
Interview Summary, November 3, 1999	Interview Summary_110399.doc	M&R-5-A-6	KCI
Server Usage Report, Application: TAFI	TAFI Usage.xls	M&R-5-A-7	BLS
CLEC TAFI Usage (2000)	USE_2000.xls	M&R-5-A-8	BLS

Document	File Name	Location in Work Papers	Source
<i>BellSouth Telecommunications Information Technology – Capacity Planning Methodology, Practices and Requirements – July, 1999</i>	Cap_methodology.doc	PRE-6-A-1	BLS
Interview Summary – BCS Transport	Interview_summary_121599.doc	PRE-6-A-2	KCI
BOSIP Network Diagrams	AtIntadc.ppt Bosipcor.ppt Brmgmdc.ppt Chrltdc.ppt Jcksondc.ppt Miamiadc.ppt Nsvlledc.ppt	PRE-6-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

Document	File Name	Location in Work Papers	Source
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
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
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
Data Collected 11/19/99 – (Status Report, by project, of Midrange data collection tool installation)	Perform1.doc	PRE-6-A-29	BLS
Interview Summary – Capacity Planner	Interview_summary_01272000.doc	PRE-6-A-30	KCI
TAFI Usage Report	TAFI Usage.xls	PRE-6-A-34	BLS
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

Document	File Name	Location in Work Papers	Source
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
Project List	No Electronic Copy	PRE-6-A-49	BLS
MLT Performance Data	No Electronic Copy	PRE-6-A-58	BLS
TAFI Performance Data	No Electronic Copy	PRE-6-A-59	BLS
<i>Capacity Planning & Management Playbook</i> (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
Interview Summary – Capacity Planner	Interview_summary2_03292000.doc	O&P-6-A-12	BLS
Interview Summary2 – Product Manager	Interview_summary_04132000.doc	O&P-6-A-13	BLS
Interview Summary3 – Second Capacity Planner	Interview_summary2_03292000.doc	O&P-6-A-14	KCI
Interview Summary – Product Support Manager	Interview_summary2_04132000.doc	O&P-6-A-15	KCI

Document	File Name	Location in Work Papers	Source
Interview Summary – Capacity Planning Project Manager	Interview_summary2_04182000.doc	O&P-6-A-17	KCI
Interview Summary2 – Capacity Planning Manager	Interview_summary_04182000.doc	O&P-6-A-18	KCI
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 TAFI 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 TAFI systems. These interviews were supplemented with an analysis of BellSouth's documented capacity management procedures as well as an evaluation of related activities such as periodic capacity management reviews, system reconfiguration/load balancing, and load increase induced upgrades.

2.6 Analysis Methods

The TAFI 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 TAFI 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-5.3: M&R-5 Evaluation Criteria and Results

Test Cross-Reference	Evaluation Criteria	Result	Comments
M&R-5-1-1	There is an established process for capturing business and transaction volumes	Satisfied	TAFI transactions are tracked and reported monthly with breakouts by BRMC, RRM, CLEC aggregate, and individual CLEC. The tracking process was described during the TAFI project manager interview. KCI was provided copies of CLEC TAFI Usage reports.
M&R-5-1-2	There is an established process for capturing resource utilization	Satisfied	TAFI 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 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

Test Cross-Reference	Evaluation Criteria	Result	Comments
			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-5-1-3	Resource utilization is monitored for system components and elements	Satisfied	<p>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</p> <p>Resource utilization data are 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.</p> <p>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.</p>
M&R-5-1-4	Instrumentation and other tools are used to collect resource utilization data	Satisfied	<p>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 Performance Monitoring Web site.</p> <p>Tools running to collect network resource utilization data include TRENDSnmp (from DeskTalk),</p>

Test Cross-Reference	Evaluation Criteria	Result	Comments
			<p>Spectrum Enterprise Manager, OpenView, Nerve Center for BOSIP (the router network), and Starkeeper (for the Datakit networks).</p> <p>The tools used to collect resource utilization data were described during interviews with the TAFI project manager, Midrange Operations Group, and Network Support Team.</p>
M&R-5-1-5	Performance is monitored at all applicable levels (e.g. network, database server, application server, client, etc.)	Satisfied	<p>The Midrange Operations Groups monitor the performance of the application servers. In addition, the number of concurrent TAFI users is tracked by manually determining the total number of simultaneous users during peak times.</p> <p>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. The 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.</p> <p>These activities were described during interviews with the TAFI project manager, Midrange Operations Group, and Network Support Team. In addition, sample performance reports were collected.</p>
M&R-5-1-6	Instrumentation and other tools are used to monitor performance	Satisfied	<p>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</p>

Test Cross-Reference	Evaluation Criteria	Result	Comments
			<p>systems and networks.</p> <p>Best/1, GlancePlus, SAR, Unicenter TNG, and Tivoli are tools used to monitor midrange performance.</p> <p>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.</p> <p>Performance monitoring activities were described during interviews and sample reports were provided to KCI.</p>
M&R-5-1-7	There is an established process for forecasting business volumes and transactions	Satisfied	<p>KCI conducted interviews with the TAFI project manager, midrange systems operations personnel, network operations manager, and capacity planning resources. During initial testing, KCI found that the process for forecasting TAFI business transaction volume consisted of a 1997 one-time exercise using information provided by BLS product managers, and forecast assumptions based on experience with BLS TAFI usage. Forecasting did not appear to be done on a regular basis. See Exception 25 for additional information on this issue.</p> <p>BLS developed an appendix to the <i>Capacity Planning & Management Playbook</i> that describes an ongoing transaction forecasting process for TAFI. The TAFI forecast is derived from the LSR forecast. Exception 25 is closed.</p>
M&R-5-1-8	The business volume tracking and forecasting data is at an appropriate level of detail to use for capacity management	Satisfied	<p>The 1997 CLEC TAFI Trouble Forecast projected five years out by month with yearly totals. It includes breakdowns by LNP, Resale, Unbundling, and Loop/Port products. The report projects CLEC TAFI transactions and estimates the numbers of Trouble Reports generated. KCI was provided with a</p>

Test Cross-Reference	Evaluation Criteria	Result	Comments
			<p>copy of the CLEC TAFI Trouble Forecast.</p> <p>For BLS's network, capacity planning is done annually as part of the budgeting process and is also done for each application release. The planning process takes as input the Network Carrier Services (NCS) Marketing Group forecast, current volumes, trend data, and anticipated volume changes that may result from new system functionality. Capacity planning activities were described during interviews and KCI was provided with sample copies of the tools used internally to collect the data for the network forecast.</p>
M&R-5-1-9	There is an established process for reviewing the performance of the business and transaction volume forecasting process	Satisfied	<p>During initial testing, KCI found that actual business transaction volumes are monitored on a monthly basis to determine level of fit with forecasts. However, no established, ongoing process for reviewing the performance of the business forecasting process was observed for BLS's TAFI system. See Exception 25 for additional information on this issue.</p> <p>BLS developed an appendix to the <i>Capacity Planning & Management Playbook</i> specifying that BTSI will track and compare actual TAFI transaction volume against the forecast volume. In addition, a copy of a recent comparison of actual to forecast LSRs was provided. Exception 25 is closed.</p>
M&R-5-1-10	There is an established process for verification and validation of performance data	Satisfied	<p>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</p>

Test Cross-Reference	Evaluation Criteria	Result	Comments
			system and network resources. Any values exceeding the established threshold are highlighted in the reports, investigated, and resolved. Performance monitoring activities were described during interviews. KCI reviewed and collected sample performance and resource utilization reports.
M&R-5-1-11	Performance monitoring results are compared to service level agreements and other metrics	Satisfied	<p>BLS and the third party managing the systems operations have contracts in place governing midrange system performance. These contracts define targets for the availability of TAFI. KCI was provided with the targets for system availability and copies of reports on vendor performance.</p> <p>Service Quality Measurements are defined for availability of CLEC TAFI (OSS-3. Interface Availability [Maintenance & Repair]) and for CLEC transaction intervals (OSS-4. Response Interval [Maintenance & Repair]). (See <i>BellSouth Service Quality Measurements Plan</i> document dated 07/2000). Performance results for these metrics are reported through the Performance Monitoring and Analysis Platform (PMAP). BLS's capacity planning process identifies PMAP data as an 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 performance activities were described during interviews with the BOSIP Support Manager.</p>
M&R-5-1-12	The Capacity	Satisfied	The processes that are executed for

Test Cross-Reference	Evaluation Criteria	Result	Comments
	Management process is defined and documented		<p>performance monitoring and capacity planning activities are defined and documented. The document, <i>BLS Telecommunications Information Technology Capacity Planning Methodology, Practices, and Requirements July 1999</i>, 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 <i>Capacity Planning & Management Playbook</i>.</p> <p>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.</p> <p>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.</p>

Test Cross-Reference	Evaluation Criteria	Result	Comments
M&R-5-1-13	Resource usage and capacity is considered in the planning process for capacity management	Satisfied	<p>Midrange server utilization reports are examined on an ongoing basis and as part of the quarterly capacity planning process. The resource utilization data is aggregated and analyzed by RRMCM, BRMC, and CLEC users on a monthly basis. Resource utilization is trended and compared to known system limits to determine when the addition of capacity is warranted.</p> <p>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.</p>
M&R-5-1-14	Performance monitoring results are considered in the planning process for capacity management	Satisfied	<p>The number of concurrent users is tracked and trended against the known theoretical concurrent user limits for each TAFI system. Midrange performance monitoring reports are examined on an ongoing basis and as part of the quarterly capacity planning process. Application development, system administration, and production support resources participate in the capacity planning process.</p> <p>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.</p>

Test Cross-Reference	Evaluation Criteria	Result	Comments
M&R-5-1-15	Capacity Management procedures define performance metrics to trigger the addition of capacity, load rebalancing or system tuning	Satisfied	<p>Thresholds have been set for resource utilization and performance measures. Values that exceed the established thresholds are flagged and investigated.</p> <p>Systems and capacity planning for TAFI is formally conducted during quarterly user group meetings. CLEC representatives provide feedback to assist BellSouth in understanding business volume impacts, response rates, etc. The outcomes from these meetings include recommendations to re-balance/re-allocate system components, purchase additional hardware, and/or upgrade existing hardware. TAFI was recently upgraded and moved to a new computer.</p> <p>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.</p>