J.   Test Results: M&R Process Evaluation (M&R-10)

1.0   Description

The Maintenance and Repair (M&R) Process Evaluation examined the equivalence of BellSouth's (BLS) end-to-end processes and procedures for Retail (Business and Residential services) and Wholesale (Business and Residential services for both Resale and Unbundled Network Elements [UNEs]) trouble reporting and repair. The end-to-end process covered all activities from the moment a trouble ticket is captured in BellSouth's systems until the same trouble is closed and the customer is notified of the resolution.

The test for the M&R process evaluation was subdivided into two sub-tests.

Sub-Test 1 evaluated the consistency of processes and documentation used by BellSouth for retail and wholesale customers.

Sub-Test 2 involved the execution and observation of selected M&R test scenarios, and evaluated BellSouth's performance in making repairs under the conditions of various wholesale maintenance scenarios.

2.0   Methodology

This section summarizes the test methodology.
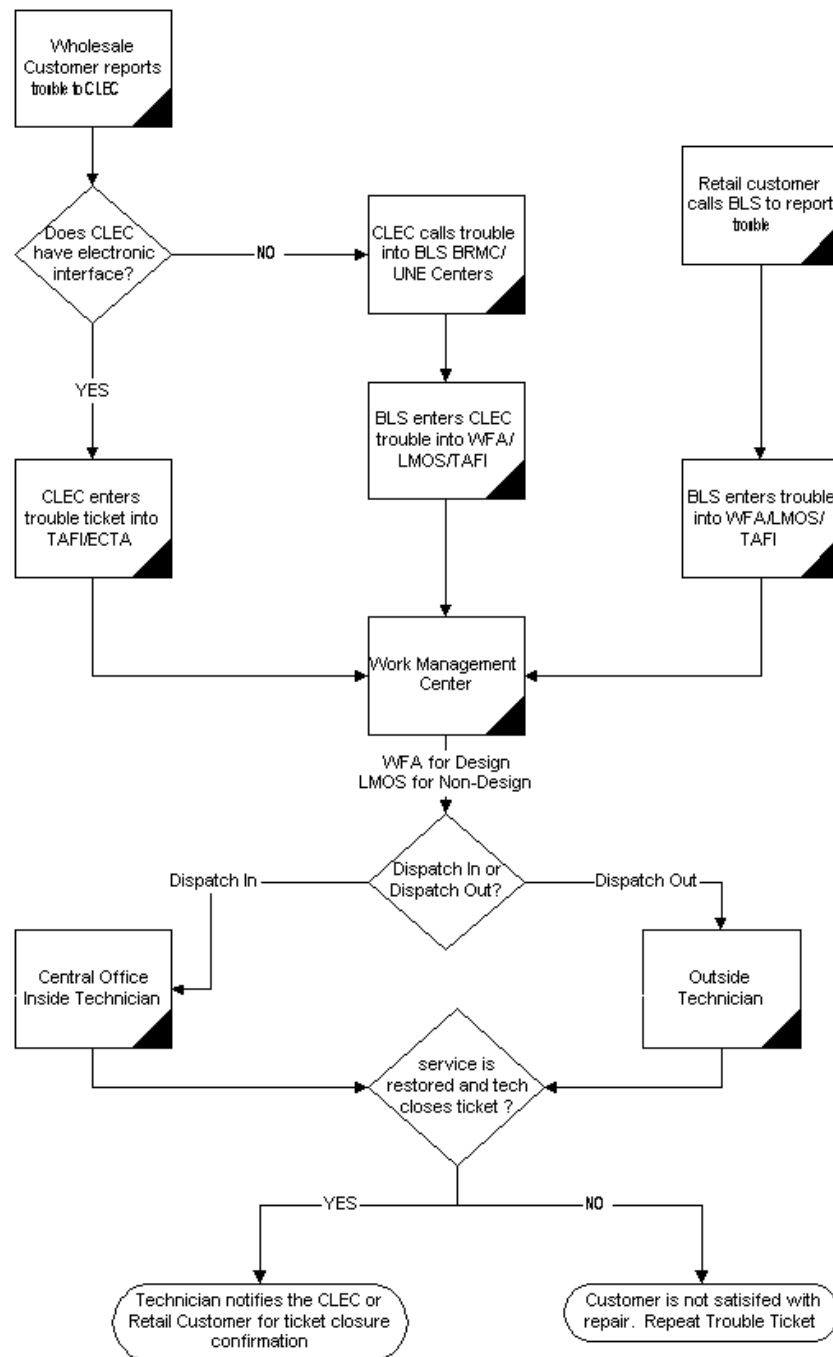
2.1   Business Process Description

BellSouth's M&R administration and trouble repair process flows are described at a high level below and are documented in Figure VII-10.1. See Section VII, "M&R Overview" for a detailed description of the BellSouth M&R processes.

The Trouble Analysis Facilitation Interface (TAFI) is used to capture resale trouble tickets for Plain Old Telephone Service (POTS). TAFI also manages information related to trouble tickets passed to outside technicians for non-designed services (SL1) with a 10-digit telephone number. The Electronic Communications Trouble Administration (ECTA) Gateway is used to capture trouble tickets for designed (SL2) and non-designed (SL1) circuits. The Loop Maintenance Operation System (LMOS) is used to capture trouble tickets for non-designed services having telephone lines with more than 10-characters. The Work Force Administration (WFA) system captures the trouble ticket data for designed circuits (SL2) utilizing circuit IDs. Staff at the Work Management Center (WMC) schedule technicians and allocate outstanding trouble tickets to a Dispatch In (DI) or Dispatch Out (DO) status. The same technician workforce addresses troubles and repairs for BellSouth Retail and Wholesale customers.

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The test concentrated on the BellSouth procedures, as well as the consistent application of those procedures, for wholesale services involved in the M&R process.

Figure VII-10.1 illustrates the BellSouth M&R process flow.

Figure VII-10.1: M&R-10 Business Process Flow

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2.2   Scenarios

Multiple M&R scenarios were used to evaluate the M&R trouble repair performance process. Table VII-10.1 summarizes the scenarios used for the end-to-end test in Sub-Test 2.

Table VII-10.1: M&R Trouble Repair Performance Process Scenarios

Scenario No.	Scenario Title and Description
1	CLEC reports UNE SL2 analog loop trouble to BLS on behalf of CLEC residential customer who cannot originate or receive calls.
2	CLEC reports SL2 UNE analog loop trouble to BLS on behalf of CLEC business customer who cannot originate calls.
3	CLEC submits trouble report on an SL2 UNE analog loop to BLS on behalf of CLEC residential customer who cannot receive calls.
4, 4a	CLEC submits trouble report on UNE SL2 analog loop to BLS in response to CLEC residential customer's complaints of crosstalk.
6, 6a	CLEC reports trouble on SL1 UNE digital loop to BLS in regard to CLEC business customer complaint that they cannot originate calls.
7, 7a	CLEC reports trouble on SL2 UNE DS1 digital loop to BLS on behalf of residential customer who cannot originate calls.
16	CLEC queries BLS maintenance & repair systems to obtain trouble history report for small CLEC business customer served by BLS-provided unbundled analog loop port combination.
18	CLEC reports customer cannot originate call on one SL2 UNE DS1 digital loop to BLS.
19	CLEC reports trouble on UNE ISDN BRI loop to BLS on behalf of CLEC residential customer who cannot make or receive calls.
20b, 20c	CLEC submits trouble No Dial Tone (NDT) on UNE ISDN BRI loop to BLS in response to CLEC residential customer's report. Trouble report merits Emergency Commitment.
21	CLEC reports trouble on three UNE ISDN BRI loop to BLS on behalf of CLEC residential customer who cannot originate calls.
22a	CLEC reports trouble on ISDN BRI UNE loop in response to customer who cannot receive calls.
25a	CLEC reports trouble with UNE port to BLS in response to CLEC business customer complaint that calls cannot be originated on any line.
28	CLEC reports to BLS that features for CLEC business customer are not working properly due to UNE analog port.
30a	CLEC queries BLS maintenance and repair system to validate calling rate plan for CLEC residential customer served by BLS provided UNE analog port.
33a	CLEC reports SL2 UNE analog loop trouble to BLS on behalf of CLEC business customer who cannot receive or originate calls.

Scenario No.	Scenario Title and Description
34a	CLEC reports SL2 UNE DS1 digital loop trouble to BLS in regard to CLEC residential customer complaint that they cannot originate calls.
35	CLEC reports UNE SL2 analog loop trouble to BLS in response to CLEC business customer complaint that they cannot originate calls.
39, 39a	CLEC reports no dial tone on SL1 UNE analog loop to BLS in response to CLEC business customer complaint.
41	CLEC reports vertical feature trouble on UNE ISDN-BRI port to BLS for CLEC residentail line.
46	CLEC reports trouble on resale POTS line on behalf of CLEC business customer unable to receive calls.
46a, 46b, 46d	CLEC reports trouble on resale POTS line on behalf of CLEC business customer unable to receive calls.
47, 47a, 47b, 47c, 47d	CLEC reports trouble on resale POTS line on behalf of CLEC residential customer unable to receive calls.

2.3   Test Targets & Measures

The test target was the Wholesale (Resale/UNE) Maintenance and Repair end-to-end processes, procedures, and performance. KCI did not test BellSouth's retail circuits, analyze BellSouth-published metrics, or validate their accuracy in this test. 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-10.2: Test Target Cross-Reference

Sub-Process	Function	Evaluation Criteria	Test Cross-Reference
End-to-end M&R Process	Process Flow Documentation	Completeness Wholesale and Retail Comparison	M&R-10-1-1 M&R-10-1-2 M&R-10-1-3 M&R-10-1-4
	Process evaluation	Wholesale and Retail Comparison	M&R-10-1-5 M&R-10-1-6 M&R-10-1-7 M&R-10-1-8 M&R-10-1-9 M&R-10-1-10 M&R-10-1-11 M&R-10-1-12

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Sub-Process	Function	Evaluation Criteria	Test Cross-Reference
End-to-end Trouble Report Processing	M&R Test Situations	Timeliness Wholesale Performance	M&R-10-1-13 M&R-10-1-14 M&R-10-1-15

2.4   Data Sources

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

Table VII-10.3: Data Sources for M&R Process Evaluation

Document	File Name	Location in Work Papers	Source
CLEC TAFI End User Training and User Guide EP – Issue 6, September 1998	No Electronic Copy	M&R-10-A-1	BLS
BLS *Overview – Maintenance & Repair Process*	No Electronic Copy	M&R-10-A-2	BLS
BLS Resale Maintenance Center (BRMC) Interview Summaries and Approvals, November 4, 1999	Printed Copy Interview_BRMC_Returned.doc	M&R-10-A-3	BLS/KCI
BLS Unbundled Network Center (UNEC) Interview Summaries and Approvals, November 5, 1999	Printed Copy Interview_UNE_Center_Returned.doc	M&R-10-A-4	BLS/KCI
BLS Business Repair Center (BRC) Interview Summaries and Approvals November 11, 1999	Printed Copy Interview_BRC_Returned.doc	M&R-10-A-5	BLS/KCI
BLS Residential Repair Center (RRC) Interview Summaries and Approvals November 9, 1999	Printed Copy Interview_RRC_Macon_Returned.doc	M&R-10-A-6	BLS/KCI
BLS Work Management Center (WMC) Interview Summaries and Approval November 10, 1999	Printed Copy Interview_WMC_Returned.doc	M&R-10-A-7	BLS/KCI
BLS Outside Technician Interview Summaries and Approval December 20, 1999 December 21, 1999 January 6, 2000	Printed Copy Interview_Macon_Tech_Returned.doc Interview_Augusta_Tech_Returned.doc Interview_PowerFerry_Tech_Return.doc	M&R-10-A-8	BLS/KCI
Electronic BLS messages.	No Electronic Copies	M&R-10-A-9	BLS/KCI

Document	File Name	Location in Work Papers	Source
1999 GA RRC Report Card RRC Performance Evaluation	No Electronic Copy	M&R-10-A-10	BLS
Business Repair Center (BRC) _Control Office Administration for Special Services Trouble Report._ (BSP 660-225-102BT Issue G, June, 1994) BRC Performance Evaluation	Printed Copy BRC_M&P.txt	M&R-10-B-1	BLS
Methods and Procedures from the BLS Resale Maintenance Center and Unbundled Network Center (Multiple Sections with indivdual version numbers and issue dates)	No Electronic Copies	M&R-10-B-2	BLS
Example of a LMOS Trouble Ticket History Report.	No Electronic Copy	M&R-10-B-3	BLS
Example of a WFA Trouble Ticket History Report.	No Electronic Copy	M&R-10-B-4	BLS
KCI internal document evaluating the 7 discounted M&R-10 ISDN line types	Printed Copy MR10ISDN.doc	M&R-10-C-1	KCI
Internal M&P's from the BRMC (Produced during follow-up interview)	No Electronic Copy	M&R-10-C-2	BLS
Internal M&Ps from the UNE Center (Produced during follow-up Interview)	No Electronic Copy	M&R-10-C-3	BLS
Test bed performance measurement	No Electronic Copy	M&R-10-C-4	BLS/KCI
M&R-10 Master Test Bed	Printed Copy MRMASTR.xls	M&R-10-C-5	KCI
KCI ISDN Test Cases	No Electronic Copies	M&R-10-C-6	KCI
KCI POTS Test Cases	No Electronic Copies	M&R-10-C-7	KCI
KCI SL1/SL2 Test Cases	No Electronic Copies	M&R-10-C-8	KCI
KCI DS1 Observed trouble reports	No Electronic Copies	M&R-10-C-9	KCI
Customer Service Requests (CSRs)	No Electronic Copies	M&R-10-D-1	BLS
Work Management Center Methods & Procedures (Mulitple sections with individual version numbers and issue dates)	No Electronic Copies	M&R-10-E-1	BLS

2.4.1 Data Generation/Volumes

Trouble tickets were created on KCI test bed[1] accounts and tracked using the TAFI and Electronic Communications Trouble Administration (ECTA) interfaces. Calls were placed to the UNE Center and the BellSouth Resale Maintenance Center following the trouble repair process. No volume testing was required for this evaluation.

2.5   Evaluation Methods

Sub-Test 1 activities were developed based on KCI's understanding of BellSouth's Retail and Wholesale M&R end-to-end processes. In addition, interviews were conducted at BellSouth Retail and Resale/UNE work centers to evaluate the working knowledge of existing processes and procedures, specifically relating to the trouble ticket process, tracking system process, back-end analysis performance, use of test systems, and repair technicians utilization for both Retail and Resale customers.

M&R documentation and information was gathered and interviews were conducted at the following BellSouth work centers:

- The BellSouth Unbundled Network Element Center (UNEC) center provides a single point of contact and accountability for the provisioning and maintenance of UNEs and interconnection trunk services for all registered facility-based CLECs. The UNEC is responsible for responding to all CLEC informational inquiries. The center also controls, tests, coordinates, and analyzes the installation of UNEs, and provides control, testing, analysis, and fault isolation functions for all CLEC UNE trouble reports.

- The BellSouth Resale Maintenance Center (BRMC) provides a single point of contact and accountability for the maintenance of Non-Complex Resale Services and provisioning and maintenance of Complex Resale Services for all registered Resale-based CLECs. The BRMC is divided into "Complex Services," which includes Special Service circuits, and "Non-Complex Services" known as Plain Old Telephone Service (POTS). For Complex Resale Services, the center provides control, testing, coordination, and analysis of installation. For both Complex Services and Non-Complex Services, the center provides control, testing, analysis, and isolation of trouble reports on installed services.

- The Residential Repair Center (RRC) provides a single point of contact and accountability for all BellSouth retail residential customers. Trouble reports are entered into TAFI, after which the Customer Service Administrator (CSA)

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[1] See Section VII, "M&R Overview" for a description of the M&R test bed.

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attempts to resolve the trouble. If resolution is not possible, the ticket is then passed to a Maintenance Administrator (MA) who works the ticket. Any unresolved tickets requiring dispatch of a technician are passed to the WMC for technician assignment and dispatch.

- The Business Repair Center (BRC) provides a single point of contact and accountability for all BellSouth retail business customers. The BRC is responsible for responding to all BellSouth retail business information inquiries. The BRC also controls, tests, coordinates, and analyzes the installation of non-design and designed service, and provides control, testing, analysis, and fault isolation functions for all BRC trouble reports. The Maintenance Administrator (MA) enters trouble tickets for non-designed services (TN-based) into TAFI. Any trouble tickets that cannot be resolved are passed to screeners who perform further analysis on them. Designed services are circuit ID-based, which TAFI cannot process, and are, therefore, entered into the WFA system. These tickets are assigned to Testing Technicians (TT) for resolution utilizing the Integrated Test System (ITS). Any unresolved designed trouble tickets are passed to the WMC, using a link from the Work Force Administration – Control system to either the WFA-Dispatch Out (DO) or WFA-Dispatch In (DI) system.

- The Work Management Center (WMC) provides a pool of technicians who are assigned trouble tickets that require a DI or DO. Trouble tickets entered into TAFI are sent to the WMC and placed in LMOS, which enters a date and time stamp. Technicians are given assignments based on their geographical area.   The workload is further allocated based on distance to job, distance to residence, and time commitment.

The Sub-Test 2 evaluation measured BellSouth's performance in isolating and repairing faults inserted in a working test bed of provisioned telephone lines. The fault insertions were placed in several BellSouth Central Offices (COs). KCI conducted this test during the first two weeks of December 1999 and the third week of February 2000.
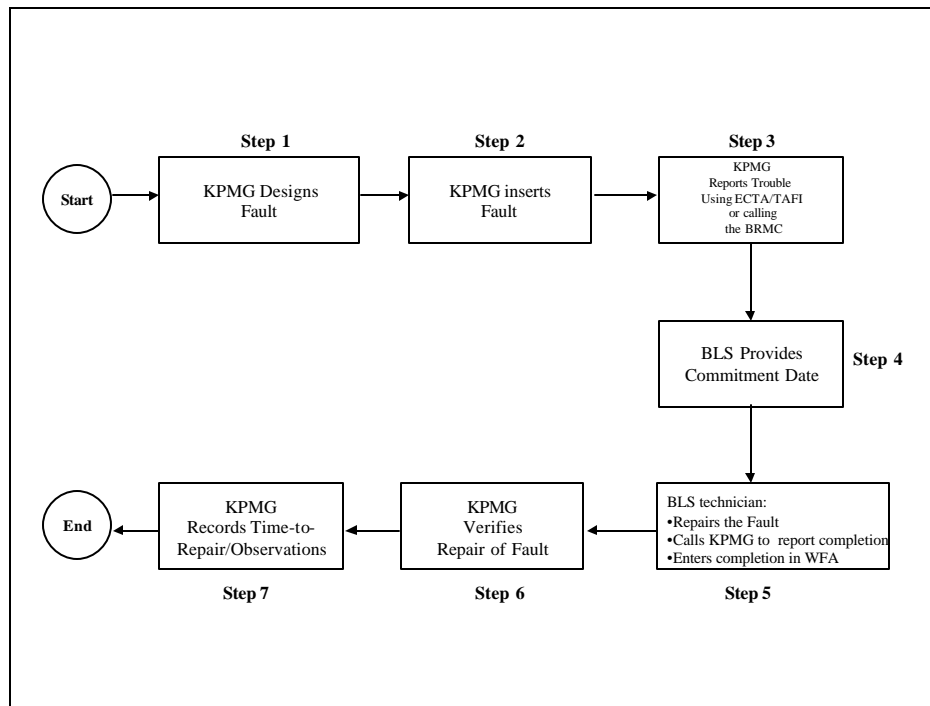
KCI used the following methods to inform BellSouth of these CLEC troubles:

- Entered troubles into TAFI
- Entered troubles into ECTA
- Telephoned troubles into the BRMC
- Telephoned troubles into the UNE Center
- After BellSouth repaired a trouble, they called the KCI CLEC to report that the service had been restored, and to provide ticket closure confirmation. KCI then physically verified that each trouble was repaired within each of the COs. For each trouble ticket that was restored to service by a BellSouth

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technician, KCI obtained test-specific LMOS and WFA reports to document each test result.

FigureVII-10.2 depicts the test approach used by KCI for each test performed in Sub-Test 2.

FigureVII-10.2: Sub-Test 2 Approach

The following steps were followed in executing Sub-Test 2:

- Step 1: KCI designed faults to be inserted based on the *Master Test Plan* requirements
- Step 2: KCI inserted faults at designated COs and Hewlett Packard (HP) locations[2].
- Step 3: KCI reported troubles using ECTA, TAFI, or by calling the BRMC/UNEC
- Step 4: BellSouth provided commitment date and time for repair activities
- Step 5: BellSouth technician repaired the fault and called the KCI CLEC
- Step 6: KCI verified repair of the fault
- Step 7: KCI documented the time to repair and observation of repair activities.

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[2] Specified test bed accounts were physically provisioned to HP locations in the Atlanta region.

Sub-Test 2 consisted of 56 individual tests included in Appendix B5 of the *Master Test Plan.* KCI inserted faults in 49 test bed lines for the M&R performance test. Included in the test were:

– 18 Designed Service Level 2 (SL2) lines, of which six required repeat calls
– 2 Non-Designed Service Level 1 (SL1) lines
– 19 Plain Old Telephone Service (POTS) lines
– 10 Integrated Service Digital Network (ISDN) lines
– 7 Digital Signal Level 1 (DS1) Lines[3]

KCI did not use seven of the ISDN line types initially included in the test bed[4]. In addition, KCI visited the UNEC to observe and examine DS1 trouble logs. During the visit seven DS1 trouble tickets were randomly selected and included in the KCI test bed for use in the evaluation.

2.6   Analysis Methods

The M&R-10 test included a checklist of evaluation criteria developed by KCI during the initial phase of the BellSouth - Georgia OSS Evaluation. These evaluation criteria, detailed in the *Master Test Plan*, provided the framework of norms, standards, and guidelines for the M&R-10 test. The data collected were analyzed employing the evaluation criteria reference 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 shown below. Definitions of evaluation criteria, possible results, and exceptions are provided in Section II.

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[3] Seven DS1 troubles were observed at BellSouth's UNE Center.

[4] There were a total of 10 ISDN line types designated in the test bed for the M&R performance test. Seven were not usable due to incomplete circuit layouts and were excluded from the M&R end-to-end test. These lines had been terminated at the Central Office (CO) backboard without a Network Termination (NT1) or Customer Premise Equipment (CPE) included. Without the NT1 and CPE, the circuit Service Profile Identifier (SPID) could not be programmed to allow sync (dial tone) between the CPE and CO office equipment (OE).

Table VII-10.4: Evaluation Criteria and Results

Test Cross-Reference	Evaluation Criteria	Result	Comments
End-to-End M&R Process			
M&R-10-1-1	BellSouth M&R process flows are complete	Satisfied	The BLS *Overview – Maintenance & Repair Process* document provides a clear and complete description of trouble ticket flows for wholesale and retail problem management.
M&R-10-1-2	BellSouth M&R process flows are accurate	Satisfied	The process flows described in the BLS *Overview – Maintenance & Repair Process* document are accurate. KCI interviewed BLS employees involved in fulfilling trouble management functions, and verified that their descriptions of the actual processes mapped to those documented in the BLS *Overview – Maintenance & Repair Process.* Interviews were conducted with representatives from the BRMC, UNE, BRC, RRC, WMC and outside technicians.
M&R-10-1-3	Parity exists between Retail and Resale M&R Process	Satisfied	Both CLEC and retail trouble tickets that are electronically entered into BLS systems follow a common process. This process, as detailed in Figure VII-10.1, is well documented in the BLS *Overview of Maintenance & Repair Process.*
M&R-10-1-4	Methods & Procedures (M&Ps) reflect the complete M&R process	Satisfied	Based on KCI's review of documentation from the Corporate Document Information Access (CDIA) system, BLS Electronic Library Services (BELS) system, internal M&P documents, and interviews with BLS personnel, BLS M&Ps encompass the complete M&R process for both Retail and Wholesale Customers.
M&R-10-1-5	M&Ps provide for a quality improvement process	Satisfied	Internal BLS documents provided by Resale/UNE and Retail centers describe the quality improvement procedures that are employed in the respective centers.

Test Cross-Reference	Evaluation Criteria	Result	Comments
M&R-10-1-6	The M&Ps provide for an escalation process	Satisfied	BLS has a documented escalation process for the BRC, as observed in document reviews and confirmed in interviews. The RRC's escalation process is documented within the CSA Handbook, Volume 1, and includes a clear and accurate escalation process. BLS's Mechanized Escalation procedures/Policy/Job Aids (JA-MEES-001 Issue 1b, December, 1999) describes an escalation process for the WMC, BRC, UNEC, and the BRMC.
M&R-10-1-7	The M&Ps document roles and responsibilities for the M&R escalation process	Satisfied	The BLS M&Ps provided to KCI define the roles and responsibilities for the M&R escalation process. BLS's Mechanized Escalation procedures/Policy/Job Aids (JA-MEES-001 Issue 1b, December, 1999) describe the roles and responsibilities for the escalation process within the WMC, BRC, UNEC, and the BRMC.
M&R-10-1-8	The M&Ps include a procedure for severity coding of trouble tickets	Satisfied	During the initial creation of a non-designed CLEC trouble ticket a commitment field is created in TAFI based on the problem type. Three types of commitments, Affected service (AS), Out of Service (OS), and Emergency, exist. All of these conditions drive the committed response time automatically to the work management centers. If the trouble condition seriously affects life or property, such as poles or cables blocking a street, or in cases of illness, death, doctors on call or a handicapped customer call, an emergency commitment is generated. Once a ticket is identified as emergency, the time to repair commitment is defined as <3 hours. For designed circuits the customer information record created during provisioning contains customer type information used for severity coding in WFA. The *CLEC TAFI End User*

Test Cross-Reference	Evaluation Criteria	Result	Comments
			Training and User Guide provides documentation for severity coding of a trouble ticket.
M&R-10-1-9	The M&R process includes performance monitoring	Satisfied	The RRC, BRC, BRMC, and UNE work centers produce monthly scorecards which provide internal metrics and performance data. These reports include Maintenance Average Duration, Out of Service > 24 hours, Percent of Repeat Troubles, and Missed Repair Appointments.
M&R-10-1-10	Trouble ticket performance is tracked and reported	Satisfied	The BLS *Overview – Maintenance & Repair Process* document indicates that non-designed trouble tickets are tracked and reported by the LMOS history log report (OSSLOG). Designed trouble tickets are tracked and reported by the WFAC report (OSSTRE). Each BLS work center produces a monthly report from LMOS & WFA data showing ticket performance such as Average Time to Repair, Missed Commitments, and Out of Service > 24 Hours. This also was confirmed during conversation with work center management.
M&R-10-1-11	The M&Ps include procedures for documenting of unresolved trouble tickets	Satisfied	BLS has a policy for the BRC to document unresolved trouble tickets. This information is found under the Chronic Investigation Guideline section of the BRMC *Control Office Administration for Special Services Trouble Report.* The RRC provided a response in an electronic format stating that unresolved trouble tickets are escalated to the necessary level to achieve resolution.
M&R-10-1-12	Problem status of trouble tickets is tracked and is readily accessible	Satisfied	Non-Designed trouble tickets can be tracked by the LMOS log report and a designed trouble ticket can be tracked by the WFA log report. These reports are readily accessible to BLS staff handling the trouble ticket, as well as

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Test Cross-Reference	Evaluation Criteria	Result	Comments
			to the CLEC upon request to the BRMC or UNE center.

Test Cross-Reference	Evaluation Criteria	Result	Comments
End-to-End Trouble Report Processing			
M&R-10-1-13	BLS accurately closes trouble tickets as defined in M&R test bed circuits	Satisfied	The BLS technician pool accurately closed all 49 KCI trouble tickets. However, 8% of the time no call back notification, indicating that the trouble had been repaired, was given to the KCI CLEC.
M&R-10-1-14	BLS provides commitment date and times for test bed circuits	Satisfied	Trouble tickets that were telephoned to the BRMC or UNE Center were given a commitment date and time by the receiving BLS technician. The entry of trouble tickets into TAFI and ECTA generated commitment dates and times from the online system. The Joint Implementation Agreement (JIA) for ECTA Gateway for Local Service includes a description of the commitment date and time stamp for ECTA located in Appendix B, No. 13. The *CLEC TAFI End User Training and User Guide* provides documentation for commitment dates and times, found in section 7.4, Access and Commitment Window.
M&R-10-1-15	BLS's M&R systems accurately capture and track the relevant data used in performance tracking and the measurement of trouble tickets for test bed circuits	Satisfied	BLS M&R systems accurately captured and tracked KCI's 49 fault insertion scenarios and the relevant data used in performance and measurement of trouble tickets. KCI trouble tickets were created using various methods that included TAFI to capture resale trouble tickets for POTS, ECTA for one SL2 UNE Loop, calling the BRMC for non-design circuits, and calling the UNE Center for all design circuit troubles. LMOS captured relevant data for KCI's POTS and non-designed circuits (SL1) such as start time, stop time, type of circuit, reported trouble, escalations, irate calls, resolution of trouble, and BLS technician callback. WFA performed the same function such as capturing start time, stop time, circuit type, reported problem,

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Test Cross-Reference	Evaluation Criteria	Result	Comments
			escalations, irate calls, resolution of trouble, and BLS technician callback for designed circuit types (SL2). These systems generate history logs that act as inputs to BLS reporting systems. The date/time stamps from these reports were compared to each LMOS or WFA report to measure performance, and to ensure accurate tracking of each trouble ticket. The date/time performance measures were used to evaluate maintenance duration time, missed repair appointments, and out of service >24 hours.