SBC-002-316-022
SBC Collocation Synchronization M&P

Abstract

Presented in this document are the methods and procedures to implement synchronization interconnection to CLECs/ILECs and private networks deployed within the SBC Network.
Audience: The primary audience for this document is SBC Local Exchange Carrier personnel in the following disciplines, Switch Capacity Planner/Engineer, Transport Equipment Engineer (TEE), Facility Equipment Engineer (FEE), Digital Transport Engineer (DTE), Maintenance Engineer, Space Planner, Frame Planner, Long Range Technical Planners and Fundamental Network Planning.

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Table of Contents

1. Copyright Page

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2. Reasons for Issue/Reissue

This M(ethods) & P(rocedures) document is being issued to consolidate and standardize the SBC 13-State (SNET, AIT, SWBT, PacBell, Nevada Bell) Collocation Synchronization policies. The INTEGRITY of the SBC switch and transport networks is first and foremost; most especially, with the potential of BITS/(TSG/SSU) application and forward deployments paralleled with POWER being one of the most critical and disastrous points of failure. Each and every CLEC ALWAYS has its premier option of PLESIOCHRONOUS operations rather than "a non-service guaranteed" DS1 synchronous interconnection via the SBC network.

3. Introduction

SBC networks routinely interface/interact/interconnect directly and/or indirectly with CLECs, Inter-Exchange Carrier (IECs), other Local Exchange Carriers (LECs), cellular providers, and private networks. The SBC networks can operate/co-operate in any of the following modes of operation when interconnected to another or other networks: Plesiochronous or provide timing. Plesiochronous operations describe the interface between two networks that are traceable to separate Primary Reference Source (PRSs). The effect of the frequency offset, if any, due to the separate Stratum-1 traceability is a low slip rate. In worst case when each PRS is operating at Stratum-1 requirements extremes of ±1x10 –11, the expected slip rate between the networks is less than 1 slip in 72 days.

An operations view of synchronization from an SBC Enterprise perspective will assist all in the goal SBC is striving toward.

PLESIOCHRONOUS interface operations afford many protection schema, customized redundancy and emergency restoration approaches NOT available with “non-service guaranteed” synchronous interface operations. DS1 (frequency vs. phase) signals ONLY (sans ESF and/or B8ZS encoding) shall be the synchronous interface standard, be it from customary pre-existing service deployed Symmetricom T(iming) O(utput) T(1) A(uto-protect) cardsets, or SBC’s forward deployment technology Datum AMI/SF-20/10 cardsets. Cabling distances NOT to exceed 655 linear CABLE feet can typically be dealt with; each output cardset-port must see a balanced 100 Ohm resistive termination.

As these BITS/TSG output cards are actively and forward deployed for present or pending services SBC network elements, there, potentially, could be co-existing service or assignments sharing to pending service CLEC/ILEC/Private networks assignments. Hence, in the extreme interest of SBC Network survivability, low casualty, and timely trouble analyses toward rapid restoration, all CLEC/ILEC/Private networks shall be assigned to one dedicated output cardset(s) throughout the cardset's exhaust. Adopting this posture, in the event of any casualty situations, service-affecting failure(s) or trouble conditions, there is much less of a detriment potential to SBC switch and transport network integrity. Given the BITS/TSG software, firmware and hardware pieces have finite life cycles, with no advance warning alarm schema to indicate impending failure modes or conditions; having an extensive network at the mercy of 'synchronous DS1 interface' is why plesiochronous operations deserve very strong consideration.

BITS/TSG/SSU output cards have either 10 or 20 DS1 outputs per card; shorts, grounds and/or opens on interconnected element cabling or network element terminations affect not only the CLEC/ILEC/Private networks' equipment but card associated SBC network elements as well. In the 10-output card scenario without the benefit of card dedication, not only will the CLEC/ILEC/Private networks' network element terminations be affected but shared SBC network terminations as well; the same holds true for 20-output cards. Failures on each of four (multiple, or range of) 10/20 output cards potentially affect a range of forty to eighty outputs, respectively. Whereas, with CLEC/ILEC/Private network cardset dedication, potential disturbances affect that cardset's terminations only; with any effect being lessened or mitigated by the shelf's protection schema. The embedded base BITS/TSG/SSU protection scheme protects only one card (with its preemption by the next card failure), thereby leaving any remaining faulted cards out-of-service.

PLESIOCHRONOUS operation is always the premier option; actually, requiring no internetworking cable runs or terminations, no diversity or redundancy issues, in essence, allowing independent control of 'your own timing destiny'. Basically, two signals are plesiochronous if their corresponding significant instants occur at nominally the same rate; with any variations in the rate being constrained within specified limits. DS1 signals are plesiochronous as they involve multiple digital synchronous circuits running at different clock rates; the differences in clock speeds are resolved through the use of a master clock scheme (or Primary Reference Source/Stratum 1) based presently/principally on the decay of Cesium-133. GR-1244-CORE, GR-436-CORE

2. All CLECs/ILECs and private networks are relegated to one dedicated DS1 output cardset through that cardset's exhaust; to positively maintain and sustain SBC network protection. Fault activities/conditions on any one card, potentially affect all outputs to all network elements traceable to that one particular card. To minimize and less complicate 'off-peak' technical analyses, and recovery/restoration operations, the SBC sync network MUST remain segregated from those of the CLEC/ILEC/Private network for these integrity and protection reasons. Spreading output terminations over more than one DS1 output cardset preempts any TSG output fault protection switching. Pre-existing embedded deployment BITS/TSG technologies provide only '1xN' protection schema. Hence, only marginal redundancy is a feature of DS1 (bit synchronous) interface to CLECs/ILECs/Private networks…any redundancy should/shall be integrated into the network element itself via its internal clock oscillator(s) holdover feature/function.

3. ONLY inter-office DS1 (frequency/bit synchronous, framed all-ones) signals are handed off; intra-office Composite Clock (phase/byte synchronous) signals are EXCLUDED and NOT available. CAVEAT: Supplied frequency synchronous DS1 signals are at any time subject to anomalies such as change-of-frame alignment associated with rearrangement activities and network equipment failures.

****Synchronization provisions per GR-253-CORE are not available.****

4. CLEC/ILEC/Private network DS1 synchronous interface MUST be approached, and provided first and foremost with the maintenance and sustenance of our SBC network in mind, to absolutely MINIMIZE any potential for service-affecting conditions. The CLEC/ILEC/Private network sync interfaces are Synchronous DS1 signals ONLY. Those network elements being synchronized via dS1 input(s) do indeed have INTERNAL STRATIFIED clock holdover and decay functionality. Any DIVERSITY issues or concerns in the CLEC/ILEC/Private network DS1 synchronous interface arena shall be managed via the network element(s)' resident Clocks' Holdover features. Input Reference diversity is only applicable to SBC Central Office BITS/TSG Master shelf configurations.

5. Therefore, B(ridging) O(ffice) R(egenerator) isolation and protection shall be E(ngineered), F(urnished) and I(nstalled) in all synchronous interface loops. For principal office application and deployment, ADC TBK-23R-28PNL is the approved and recommended B-O-R panel. For small office application and deployment, that option of one or multiple PAN'ed M1544-340 is approved as well. Associated ADC drawings ADCP-81-107, ADCP-80-358 and ADCP-61-143 apply.

The B-O-R Isolator/Buffer/Distributor panel, its associated DSX Interconnect Panel and Fuse Panels shall comprise one complete assembly. Standardized SBC 13-State forward equipment deployments shall be in miscellaneous bay locations, where practical and possible, closely centralized to majority CLEC/ILEC/Private network presence. Although, consideration has been given to embedded bases of operations, however, SBC STANDARDIZATION is the goal of this document. See files attachments

6. Reference documentation is A(merican) N(ational) S(tandards) I(nstitute) ANSI T1.101-1994, CB-119, GR-499-CORE and SBC guidelines:
BITS/TSG clock output connections must be the LAST terminations made. BITS DS1 outputs MUST see a balanced 100-Ohm resistive termination to prevent shelf/card port alarms and potential service disruptions. The burden of assuring signal and level compatibility with SBC DS1 synchronous interfaces rests with the CLEC/ILEC/Private network receiving timing. Also, cabling E(ngineered) F(urnished) & I(nstalled) by the vendor must conform to the following:
C(ompatibility) B(ulletin) CB-119 and GR-499-CORE specify DS1 template with respect to pulse shape, etc.. Interconnecting cabling shall be:
BF-22 specification (SBC PAN'ed Avaya 1175-001A/C108-672-874) <conductors are polyethylene insulated, tinned copper wires which are twisted into pairs covered with continuous shielding; has a nominal characteristic impedance of 124 Ohms @ 4MHz, a nominal mutual capacitance of 12.6pF per foot, and nominal attenuation per 100 feet of 0.245dB @ 1MHz, 0.490dB @ 4MHz and 0.786dB @ 10MHz). Mechanically, the cable assembly MUST be red-sheathed in color and shall have tensile strength and survivability to withstand inter-floor, multi-floor cable runs and pulls. See file attachment

6. Timing Arrangements (Caged, Shared Cage and Cageless)

CLEC/ILEC/Private networks may elect to have or not to have SBC provide DS1 synchronous timing to the CLEC/ILEC/Private networks' equipment. If SBC DS1 synchronous interconnection is elected, this mode of operation requires JOINT ADMINISTRATION, such that synchronization rules of hierarchical distributions are not violated. This joint administration, at a minimum, requires SBC provide DS1 interface equal to the embedded clock stratum level of the BITS/TSG in the office providing timing. The burden of ensuring internetworking compatibility with
SBC BITS defaults to the CLEC/ILEC/Private network receiving timing. Timing, if requested by the CLEC/ILEC/Private network, will be provided by SBC via a B-O-R assembly and associated cabling between same and the CLEC/ILEC/Private network's dedicated space. The CLEC/ILEC/Private network will be responsible for compliant cable terminations within its Dedicated Space. Timing provided by SBC shall be properly terminated observing DS1 template mask and distance constraints. BF-22 specification (P-A-N'ed Avaya 1175A/C108-672-874) cabling via the B-O-R assembly is standard. No "SPARE" synchronization assignments provided by SBC.

SBC 13-State Synchronous DS1 interface configuration consists of the following:
Central Office B(uilding) I(ntegrated) T(iming) S(upply)/T(iming) S(ignal) G(enerator) dedicated DS1 output card directly input sourcing B(ridging) O(ffice) R(egenerator) Isolator/Buffer/Distributor Assembly with associated DSX-1 hardwired panel.
See file attachment.
<http://ebiz.sbc.com/commonsystems/colloc/index.html>

The following references are the background documentation sources for synchronization clock conformance qualifications within or for interconnection/interface to the SBC network:

FR-439, Operations Technology Generic Requirements
GR-63-CORE, Network Equipment-Building System (NEBS) Requirements: Physical Protection
GR-253-CORE, Synchronous Optical Network (SONet) Transport Systems: Common Generic Criteria
GR-378-CORE, Generic Requirements for Timing Signal Generators (network elements shall be able to electrically interface to accept the external timing signal)
GR-436-CORE, Digital Network Synchronization Plan
GR-454-CORE, Generic Requirements for Supplier Provided Documentation
GR-474-CORE, OTGR Section 4: Network Maintenance: Alarm and Control for Network Elements
GR-487-CORE, Generic Requirements for Electronic Equipment Cabinets
GR-496-CORE, SONET Add-Drop Multiplexer (SONET ADM) Generic Criteria
GR-499-CORE, Transport System Generic Requirements: Common Requirements
GR-518-CORE, LSSGR: Synchronization Section 18 (a module of LSSGR, FR-64)
GR-820-CORE, OTGR Section 5.1: Generic Digital Transmission Surveillance
GR-839-CORE, Generic Requirements for Supplier-provided Training
GR-1089-CORE, Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment
GR-1244-CORE, Clocks for the Synchronized Network: Common Generic Criteria
Non-conformance or questionable conformance to these baseline generic requirements would preclude deployment of or interconnection to switch/transport (e.g., ATM—a switch with a transport attitude) vendor products within the SBC enterprise telecommunications network.

5. Engineering Specifications & Technical Layout

5.1 Engineering Specifications

Power

Fuse panels identified in the below PANs are approved for use. Preferably, either, Hendry OHPGMT05R/300121571--Dual10 or the ADC 002RGCSD10PWD/300138682--Dual 10 economically and operationally work in collocation area applications.

6. Procurement

6.1 SBC Product Identification Numbers (PIDs)

See file attachments

6.2 ADC Telecommunications Parts Numbers and CLEC/CPR

See file attachments

6.3 Manufacturer Contact Information

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6.4 Product Testing and NEBS

6.0 REFERENCES

For further information or electronic copies of this document and related information, visit the internal SBC Local Exchange Carrier Web site: **http://ebiz.sbc.com/commonsystems** or **http://apex.sbc.com**

Document	Description	Issue & Date
SBC-002-203-001, Section 4	Transport-Infrastructure Deployment Guidelines (IDG) for Fiber Distributing Frames	Issue 1, Aug 2001
SBC-002-203-001, Section 12	Transport-Infrastructure Deployment Guidelines (IDG) for Fiber Optic Splitters	Issue 1, Aug 2001
SBC-002-203-001, Section 13	Transport-Infrastructure Deployment Guidelines (IDG) for Wavelength Division Multiplexing (WDM)	Issue 1, Aug 2001
SBC-002-203-001, Section 16	Transport-Infrastructure Deployment Guidelines (IDG) for Digital Cross-Connect Frames (DSX1/3)	Issue 1, Aug 2001
SBC-002-203-001, Section 18	Transport-Infrastructure Deployment Guidelines (IDG) for POTS-SPLITTERS	Issue 1, Aug 2001
SBC-002-216-025, Section 11	Switch-Infrastructure Deployment Guidelines (IDG) Main Distributing Frames	Issue 1, Aug 2001
SBC-002-316-001	UNE Deployment in the Central Office	Issue 2.1, Jan 2001
SBC-002-316-002	Collocation Provisioning Guidelines (CPG) M&P	Issue 13, Dec 2001
SBC-002-316-003	Frame Forecast M&P	Issue 8, Jul 2001
SBC-002-316-004	Tie Pair Management on MDF/IDF Frames	Issue 1, Jan 2001
SBC-002-316-005	POTS-SPLITTER Management M&P	Issue 1, Nov 2001
SBC-002-316-006	Line Sharing Deployment M&P	Issue 9, Nov 2001
SBC-002-316-007	Special Interconnection Arrangement (SIA-BFR)	Issue 4.1, Jan 2001
SBC-002-316-008	CLEC Cable Placement & Removal M&P	Issue 6, Sep 2001
SBC-002-316-009	ADSL for the Central Office M&P	Issue 12.1, Jan 2001
SBC-002-316-010	CLEC Line Sharing (CLEC Version)	Issue 7.0, Nov 2000
SBC-002-316-011	SingleMode Fiberoptic Optical Splitters M&P	Issue 3, Apr 2001
SBC-002-316-012	Line Splitting M&P	Issue 2, Nov 2001
SBC-002-316-015	Discontinuance of CLEC Equipment/Wiring M&P	Issue 3, Oct 2001
Appendix 1, SBC-002-316-015	Discontinuance Cost Worksheet	Issue 3.1, Nov 2001
SBC-022-316-022	Synchronization & Timing M&P	Issue 1, Dec 2001 (Pending)
SBC-002-316-023	Collocation Database NSS M&P	Issue 1, Mar 2001
SBC-002-316-024	CRE-Total Decommissioning M&P	Issue 1, Oct 2001 (Pending)
SBC-002-316-026	WDM M&P	Issue 3, Nov 2001
SBC-002-316-039	Collocation Provisioning Drawings	Issue 1, Dec 2001 (Pending)
SBC-002-316-041	DSX-1 Frame Deployment M&P	Issue 3, Dec 2001
SBC-002-316-042	DSX-3 Frame Deployment M&P	Issue 3, Dec 2001
SBC-002-316-043	FDF Frame Deployment M&P	Issue 3, Dec 2001
SBC-002-316-047	NP&E Finance Cost M&P	Issue 1, Jul 2001
SBC-002-316-048	CRE Space Decommissioning M&P	Issue 1, Oct 2001 (Pending)
SBC-002-316-050	CRE Collocation Provisioning Guidelines	Issue 1, Oct 2001 (Pending)
SBC-002-316-053	Fiber Protection System M&P	Issue 2, Nov 2001
SBC-002-316-056	OSP Collocation M&P	Issue 3, Sep 2000
TP 76200MP	SBC-Network Equipment – Building Systems	Issued 2001
TP 76300MP	SBC-Installation Guide within the Central Office	Issued 2001
TP 76400MP	SBC-Detail Engineer Requirements for the C.O.	Issued 2001
TP76900MP	SBC-Installation Testing Requirements	Issued 2001
SBC-002-316-101	Wire Center Planning M&P, Space Planning for the C.O.	Issue 8, Nov 2001
SBC-002-316-102	CLEC Equipment Review M&P	Issue 1, Jun 2001
SBC-002-316-103	CLEC Equipment Review M&P Flow Chart	Issue 1, Jun 2001
BSP 800-003-100MP	Standards for Network Equipment Eng & Space Planning	Issue A, Nov 1999
BSP 636-299-900MP	SBC – Fiber Distributing Frames	Issue A, Jan 2000

BSP 790-100-652MP	SBC – Power Plant Planning	Issue A, 1999
BSP 790-100-654MP	SBC – DC Plants	Issue A, 1999
BSP 790-100-656MP	SBC – DC Distribution	Issue A, 1999
BSP 790-100-655MP	SBC - Batteries	Issue A, 1999
BSP 790-100-659MP	SBC – AC Plants	Issue A, 1999
BSP 800-000-100MP	SBC – Common Systems – Hardware Products	Issue A, 1998
BSP 800-000-101MP	SBC – Network Equipment Anchoring Requirements	Issue A, 1998
BSP 800-000-102MP	SBC – Central Office Equip. Framework Design Req.	Issue A, 1998
BSP 800-000-104MP	SBC – Bracing Requirements for Equip. on Raised Floor	Issue A, 1998
BSP 800-000-150MP	SBC – CO Cable & Wire Inst Req. Racks and Raceways	Issue A, 1998
BSP 800-003-100MP	SBC – Space Planning Stds for Network Equip. Environ.	Issue A, 1998
BSP 800-003-101MP	SBC – Thermal Management Requirements	Issue A, 2001
BSP 800-006-150MP	SBC – Common Systems Net. Fac. Aux Frame & Bracing	Issue A, 1998
BSP 800-006-151MP	SBC – Network Facility Cable Rack Requirements	Issue A, 1998
BSP 800-006-152MP	SBC – Floor Stanchion Supported Cable Rack Req.	Issue A, 1998
BSP 800-068-150MP	SBC – Central Office Equip. Framework Support Req.	Issue A, 1998
BSP 800-003-200MP	SBC – Network Facilities Cable Mining	Issue A, 2000
BSP 802-001-180MP	SBC – Grounding and Bonding Requirements	Issue A, 1998
PBSD ID-1891	SBC Interconnection Drawings for SWBT/PB/NB	Current
PBSD ED-1891	SBC Engineer Drawings for SWBT/PB/NB	Current
AM-E-01578-10	SBC Design Equipment Drawings for Ameritech	Current
AM-W-01578-11	SBC Design Wiring Drawings for Ameritech	Current
SNE J95215-71	SBC Line Sharing Equipment for SNET	Current
SNE T95215-31	SBC Line Sharing Wiring for SNET	Current
SNE J99121-71	SBC Physical Collocation Equipment for SNET	Current
SNE T99121-31	SBC Physical Collocation Wiring for SNET	Current
SNE J95215-71	SBC Engineer Drawings for SNET	Current
PBSD-ED-1175	SBC Equipment Drawing DSX-1 for PB/SWBT	Current
PBSD-ID-1075	SBC Interconnect Drawing DSX-1 for PB/SWBT	Current
SNE J95197-71	SBC Equipment Drawing DSX-1 for SNET	Current
SNE T95197-31	SBC Interconnect Drawing DSX-1 for SNET	Current
SNE SD95197-01	SBC Schematic Drawing DSX-1 for SNET	Current
AM-E-01436-10	SBC Equipment Drawing DSX-1 for AIT	Current
AM-W-01436-11	SBC Interconnect Drawing DSX-1 for AIT	Current
PBSD-ED-1115	SBC Equipment Drawing DSX-3 for PB	Current
PBSD-ID-1115	SBC Interconnect Drawing DSX-3 for PB	Current
PBSD-ED-1117	SBC Equipment Drawing DSX-3 for SWBT/PB/NB	Current
PBSD-ID-1117	SBC Interconnect Drawing DSX-3 for SWBT/PB/NB	Current
SNE J95213-71	SBC Equipment Drawing DSX-3 for SNET	Current
SNE T95213-31	SBC Interconnect Drawing DSX-3 for SNET	Current
AM-E-01447-10	SBC Equipment Drawing DSX-3 for AIT	Current
AM-W-01447-11	SBC Interconnect Drawing DSX-3 for AIT	Current
PBSD-ED-1140	SBC Equipment Drawing FDF for PB/SWBT	Current
PBSD-ID-1140	SBC Interconnect Drawing FDF for PB/SWBT	Current
SNE J95145-71	SBC Equipment Drawing FDF 12” for SNET	Current
SNE T95145-31	SBC Interconnect Drawing FDF 12” for SNET	Current
SNE J95218-71	SBC Equipment Drawing FDF 15” for SNET	Current
SNE T95218-31	SBC Interconnect Drawing FDF 15” for SNET	Current
AM-E-01582-10	SBC Interconnect Drawing FDF for AIT	Current
PBSD-ED-1891	SBC Timing Drawing (Note 4 B)	Current
SBC-C-10005-E-00	SBC Drawing – Cageless 1000 sf Non Seismic Large Bay	Issue 1, 2001
SBC-C-10006-E-00	SBC Drawing – Cageless 1000 sf Seismic Large Bay	Issue 1, 2001
SBC-C-10007-E-00	SBC Drawing – Caged 1000 sf Non Seismic Standard Bay	Issue 1, 2001
SBC-C-10008-E-00	SBC Drawing – Caged 1000 sf Seismic Standard	Issue 1, 2001
SBC-C-50001-E-00	SBC Drawing - Fiber Raceway Materials	Issue 1, 2001
SBC-C-30001-E-00	SBC Drawing – Cageless 400 sf Seismic	Issue 1, 2001
SBC-C-30002-E-00	SBC Drawing – Cageless 400 sf Non-Seismic	Issue 1, 2001
PAN 20001017	96-port POTS-SPLITTER Approval for Use	May 2000

PAN 2000737	128-port POTS-SPLITTER Approval for Use	Aug 2000
PAN 20001000	Main Distributing Frames Approval for Use	Jan 2000
PAN 19995316	Connector Blocks Approval for Use	Jan 2000
PAN 19985029	Covers for Unit Protector and Cross-Connect fields for ADSL/xDSL Approval for Use	1999
PAN 19985018	Tight Twist Wire for 1.544 Mb/s/T1 Approval for Use	1998
PAN 19985037	Cover for Unit Protectors & Cross-Connect Fields for T1/1.544 Mb/s Approval for Use	1998
PAN 19985036	Cover for Unit Protector & Cross-Connect Fields for High Voltage Approval for Use	1998
MMP 98-06-001	Broadband Twisted Pair Wiring for Distribution and Protector Frames	Issue 2, Jan 2000
SIP 10-4500-025	Line Sharing-Non-Digital Loop Electronics ADSL for Network Services and LFO Operations	Issue 3, Jul 2000
SBC-FLASH 00-030R2	SBC Equipment Deviation for oversized Equipment	Issue 2, Nov 2000
SBC-FLASH-000-000-035	SBC IDF Installation Standard	Issue 1, Jan 2001
GR-449-CORE	Telcordia Technologies – TSGR Common Requirements Signal Interfaces	Issue 2, Dec 1998

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