Choice of Feeder technology

Assertion: BCPM is rudimentary and does not optimize technology choice

Fact:

- BCPM recognizes impact of duct congestion in urban areas
  - Copper technology in dense areas can quickly result in large numbers of full size cables in the duct runs along the main feeders or initial subfeeder segments. Costs are increased for deeper or wider trenching and larger manholes. BCPM uses fiber and electronics where grids must be served with more pair than in a single maximum sized cable.
  - HM 5.0 does not
- BCPM allows user to adjust economic crossover based on user specific studies or constraints
  - Examples of current jurisdictional constraints
    - All out-of-sight plant
    - All buried
    - Stream or river crossings in conduit
    - Restricted street openings or highway crossings
    - Special road clearance requirements
    - Buried or underground highway "dips"
  - Constraints vary by town, county, state, highway class (for crossings), etc.
  - HM 5.0 "life-cycle" algorithms not easily user adjustable – requires program/algorithm changes
  - BCPM more user flexible than HM 5.0

Serving Area Size

Serving Area Size and DLC Issues

Assertion: BCPM3 unnecessarily breaks up areas into inefficiently small serving areas.

Fact: The BCPM 3.0 developers continue to maintain that the appropriate constraint on a DLC remote cabinet size for a large DLC is 1,344 lines. Although a large DLC is designed to accommodate 2,016 lines, the cabinet size for a large DLC at a remote terminal site limits the number of lines that can be served remotely to 1,344 lines. This conclusion is based on documentation provided to the BCPM developers by DSC Communications. The description DSC provided regarding the Litespan LSC-2030 Remote Terminal Outdoor Cabinet states that, "LSC-2030 is a fully self-contained Remote Terminal (RT) containing channel banks, High Density Fiber Banks (HDFB) and auxiliary equipment **to support up to 1,344 POTS lines**.." [1] This document confirms a conversation that Mr. James Schaaf, one of the BCPM developers, had with Mr. Bud Lundmark, Applications Engineer and Manager of DSC Communications, in early December, 1997 regarding the 1,344 line limit on the remote terminal cabinet size. Mr. Lundmark indicated to Mr. Schaaf that to his knowledge, no comparable alternative for a large remote terminal cabinet size exists.

Perhaps AT&T and MCI's misperception about the number of lines that can be served by a large DLC arises from the fact that the transmission capacity of the DSC systems is 2,016 lines. AT&T and MCI are apparently confusing the capacity of the common optical

equipment which is 2016 (OC-3) with the derived voice grade channels. The Litespan system transmission capacity allows their system to "daisy chain" multiple remote terminals to fully utilize the transmission capacity of 2,016 lines. However, no individual remote terminal can serve more than 1,344 lines (less fill constraints). Indeed, BCPM 3.0 assumes that the DLC central office terminals can be as large as 2,016 lines. However, a large DLC located at a remote terminal site is constrained to 1,344 lines because of the remote terminal cabinet size as described above.

After substantial investigation, we have not been able to identify vendors of 2026 DLC cabinets and 7200 pair SAIs. If these sizes do exist, such equipment would be huge. To provide some perspective, consider a 5400 pair SAI. A 5400 pair SAI stands 5 feet 4 inches tall, 4 feet 8inches wide, and a little over 2 feet deep. The concrete pad the SAI stands on is approximately 7' by 5'. The DLC 2030 cabinet housing, capable of delivering 1344 channels, is 5 1/2 feet tall, 9 1/2 feet wide and approximately 3 feet deep. The concrete pad is approx. 7 feet x 12 feet. Another example of a DLC remote cabinet is the cabinet sold by RELTEC. The footprint of their 2016 cabinet, including concrete pad, is 14 X 20 feet and it stands 6 foot high. These sizes are not going to fit in a typical PUE easement. Private right-of-way will have to be acquired at considerable expense. In addition, the PUE cannot be obstructed to preclude other utilities access to the easement. City restrictions typically dictate the capacity of cabinets. For example, Los Angeles has a height restriction of 5 feet. Moreover, finding a location where property

[1] See Fax attached from DSC Communications p. 3.

owners would not protest obstruction of their view poses a significant obstacle to deploying such facilities, should they exist.

The criteria to begin the further breakdown of macrogrids into smaller units, in the BCPM, is based upon sound economics, standard engineering practices, and DLC equipment manufacturer constraints. All three models place a criteria on how many subscribers they intend to capture in their engineering unit. The BCPM sets this criteria at 1000 business lines plus households (this is not total lines). This does not mean that a Grid cannot contain more that 1000 business lines and households. Rather, if a macrogrid exceeds this it indicates that there may be a need to further subdivide the macrogrid to more efficiently serve the area. This subdivision occurs only if there are other "hot" spots in the macrogrid. If there are other Hotspots, the Macrogrid could be broken up into anywhere from 2 to 64 ultimate grids. The number, again, is dependent upon the actual dispersion of customers.

Therefore, BCPM grids can have any number of subscribers but are wholly dependent on the actual dispersion of the customers. When the number of customers exceeds the capacity of the large DLC, additional units are placed to serve the demand. However, it is our contention that when additional sites need to be placed i.e. the capacity of the first DLC is exceeded, the cost of property acquisition (placing large cabinets or multiple cabinets at the same site may entail the incursion of additional right-of-way costs) and the cost of distribution can be minimized by placing the DLC sites in the center of the clusters. Keep in mind though that where Universal service

funding is of concern, exceeding the size of the DLC is typically not an issue.

DSC
COMMUNICATIONS

Access Systems Group

Litespan®-2000
Litespan-2012
Starspan
Fairspan
Medispan
Litespan Access Platform

FAX COVER SHEET

Page 1 of 5

Access Systems Group
1420 McDowell Boulevard, North
Petaluma, California 94954
707•792•7000

DATE: 11/18/97 TIME: 700 AM (PST)

TO: Steve Parsons VOICE NUMBER: 314 862 6883

COMPANY: INDETEC

FAX NUMBER: 314 725 7101

FROM: John McNaught VOICE NUMBER: 707 792 7067

FAX NUMBER: 707 792 7258

COMMENTS:

Steve, Call me After you Receive These..

John

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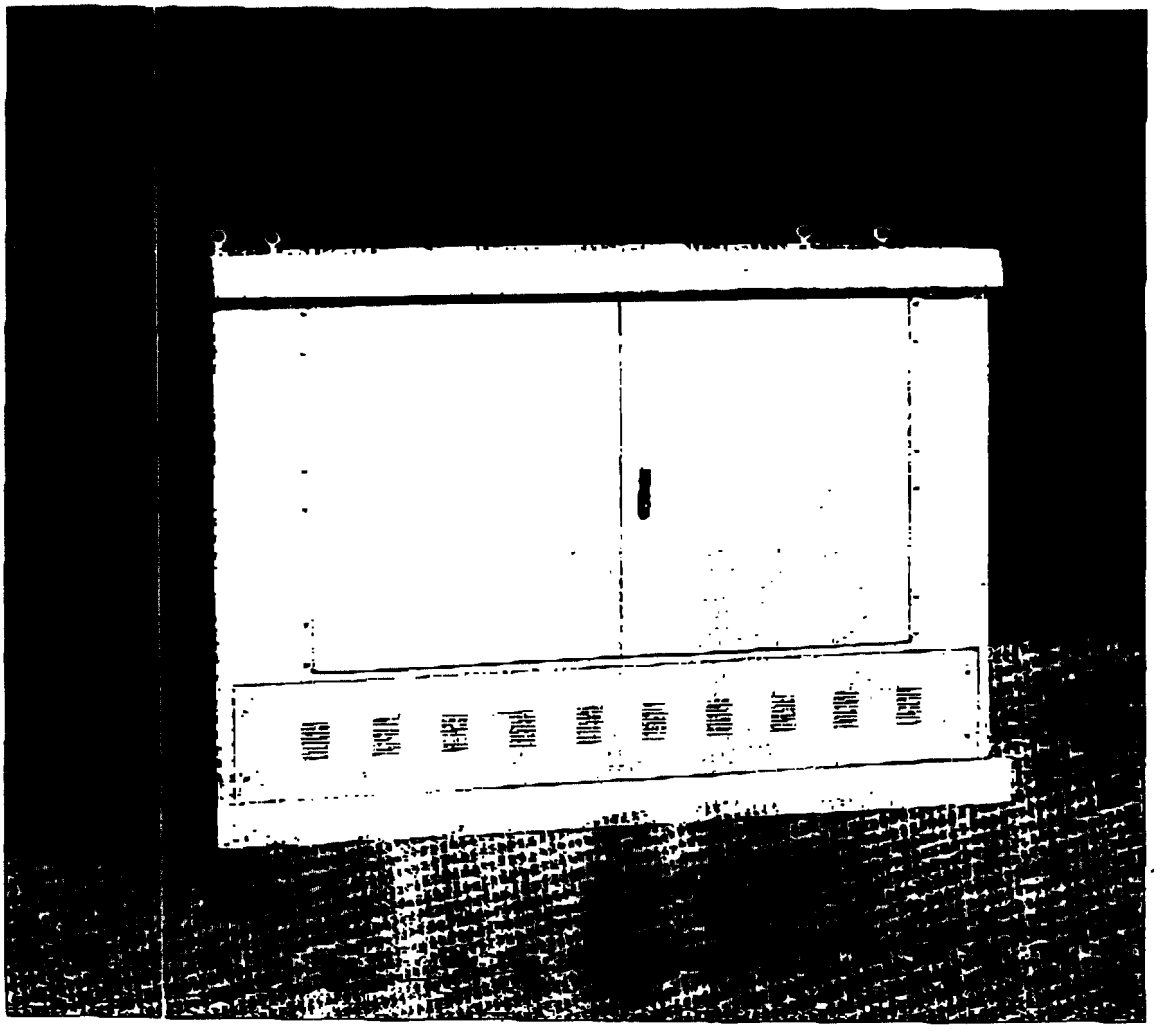
The Litespan® LSC-2030

Remote Terminal Outdoor Cabinet



DSC™
COMMUNICATIONS

The Litespan® LSC-2030
Remote Terminal Outdoor Cabinet

When you deploy Litespan®2000 Remote Terminal outdoor cabinets from DSC Communications Corporation, you are selecting some of the art technology and components packaged in a cabinet that was designed to operate in all regions of the country and survive the most extreme weather conditions.

LSC-2030 is a fully self-contained Remote Terminal (RT) containing channel banks, High Density Fiber Banks (HDFB) and auxiliary equipment to support up to 1,344 POTS lines or up to 50 DS1 or T1 lines and a proportional number of POTS lines.

The Litespan LSC-2030 is completely assembled at the factory. Once it is on-site and bolted to a mounting pad, the only assembly required consists of connecting local power connecting drop facilities, connecting optical fiber facilities, installing backup batteries and plugging the circuit packs into their assigned locations in the racks.

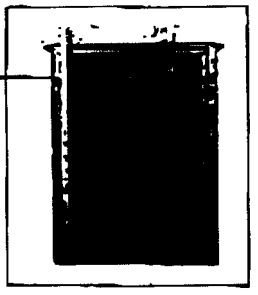
This cabinet is pre-wired at the factory for DC bulk power distribution, environmental alarm reporting, temperature control and lightning protection. Ringing power is provided by Ringing Generator Units (RGUs) installed in the Litespan channel banks. The cabinets are also provisioned for emergency battery backup and have connections for remote testing facilities.

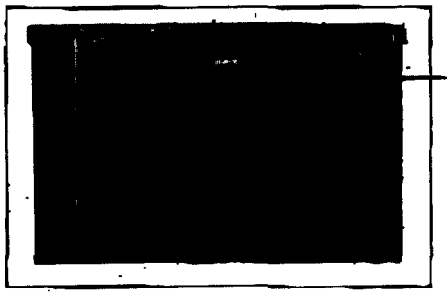
The Litespan LSC-2030 cabinet may be ordered with optional protector modules, optical splice panel, fault locate panel, remote measuring unit, T1 cross-connect and Feeder Distribution Interface (FDI). Other options include an external pedestal equipped with an emergency AC transfer switch and generator connector.

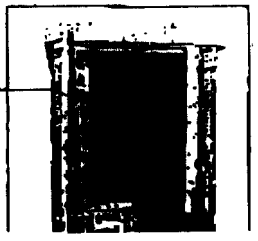
Measurements

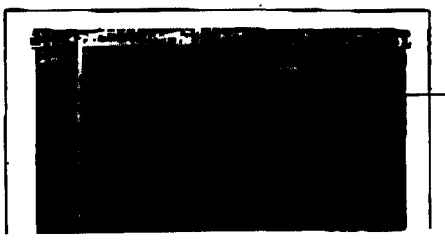
Height:	70"
Width:	103.25"
Depth:	45"
*Cabinet Shipping Weight:	Approximately 2450lbs.

*Does not include Plug-in modules or batteries.


Left Side


Side 1 (front)


Right Side (FDI optional)


Side 2 (back)

Litespan-2000 Specifications

TYPES OF SERVICES

4-wire	ISDN
800 service line	Off-premises extension
800 service trunk	Off-premises station
AIOD	Private (Meridian Business Set)
Centrex lines	PBX dc line
Consolidation of SLC-96 mode 1	PBX trunking
Consolidation of SLC-96 mode 3	POTS
Consolidation of SLC Series 5-Premium Package B	Private network T1 transport
dial tone: first coin	Secondary line
DID	Voice data type 1
Digital data services (DDS)	Voice data type 2
DLC transport	Voice data type 3
Fractional T1	WATS line 2-way
FX lines and trunks	WATS line out
High-cap T-1 transport	WATS trunk 2-way
Interoffice T-1	WATS trunk out
Interoffice T-1	Private line automatic ring down (PLAR)
	DC circuits

ENVIRONMENTAL CONDITIONS (NEBS TR-057)

Temperature	-40° to +65°C
CO & RT	(-40° to +150°F)

PHYSICAL MEASUREMENTS

Rack assembly	Height	21.3 cm (7 ft)
	Width	66.7 cm (26 in.)
	Depth	30.8 cm (12 in.)
Outdoor cabinet	Height	157.4 cm (62 in.)
	Width	203.2 cm (80 in.)
	Depth	101.2 cm (40 in.)

BELLCORE COMPLIANT

The Litespan-2000 and 2012Plus systems are designed in compliance with the following major Bellcore Standards:

Operations Technology Generic Requirements (OTGR)
TR-TSY-000008
TR-TSY-000057
TR-TSY-000253
TR-TSY-000303
TR-TSY-000386
TR-TSY-000909

OPTICAL INTERFACE

Fiber	Single-mode
Connectors	FC/PC, or customer-specified
Wavelength	1310 ± 30nm
Format	SONET

DS1 INTERFACE

DSX-1	Up to 56 DS1 positions available per channel bank
Line code	B8ZS, ZCS
Framing formats	SF (D4, SLC-96), ESF
Alarm monitoring	RCV frame slips, AIS, ESF, CRC, Yellow, BPV's

T1 INTERFACE

T1 SPAN	Up to 56 T1 positions available per channel bank
Line code	B8ZS, ZCS
Framing formats	SF (D4, SLC-96), ESF
Alarm monitoring	RCV frame slips, AIS, ESF, CRC, Yellow, BPV's
Line powering of span voltage	-130 Vdc
Current	60 mA
Line build out (XMT)	7.5, 15, 22.5 dB @ 772 kHz
Line build out (RCV)	ALBO

POTS

Capacity	Up to 224 lines per channel bank 4 lines per POTS card
Loop resistance	1950 ohms (including set)

COIN

Capacity	Up to 224 lines per channel bank 4 lines per coin card
Loop resistance	1750 ohms (including telephone set) Dial tone functions first

UVG (UNIVERSAL 2-WIRE)

Capacity	Up to 224 lines per channel bank 4 lines per UVG card
Loop design	Carrier serving area mike Loop ground/ground start Loop reverse battery

EQUALIZED UNIVERSAL VOICE GRADE (EUVG)

Characteristic	Impedance	Min. (dB)	Max. (dB)
XMIT TLP	600Ω	-9.0	+1.0
	900Ω	-9.0	+1.0
RCV TLP	600Ω	-6.0	+6.0
	900Ω	-6.0	+4.0

UNIVERSAL 4-WIRE (UEW)

4-wire impedance	Provisionable for 150, 600, or 1,200 ohms
programmable gain	0.1 dB steps over a 24.5 dB range
signaling mode	FXS, FXO, DX
4-wire E & M (EM4) signaling modes	EM4 modes I to V Tandem modes I and II PLR (pulse link repeater) Modes I and II
4-wire impedance	600 ohms
programmable gain	0.1dB steps over a 24.5 dB range
Signaling leads	E, M, RD, SD

OFFICE CHANNEL UNIT DATA PORT (OCUDP)

Data rates	2.4, 4.8, 9.6, 19.2, 56 or 64 kbps
Loopback types	OCU, CSU, DSU, and customer-controlled remote loopback
Provisioning options	Secondary channel, customer data error correction

DSO DATA PORT (DSOUP)

Primary channel lines	Secondary channel lines
2400	133.3
4800	266.6
9600	533.3
19200	1066.6
56000	2666.6
64000	Secondary channel not available

BASIC RATE INTERFACE UNIT (BRIU)

Data formats	2B+D, B1+D, B2+D, or D only
DSL data formats	2B1Q
Bit error rate	<10⁻⁷ for loops 0 and 2-15 with all impairments

ASYNCHRONOUS DS1U (ADS1U)

Framing formats	N/A (transparent)
Line coding	AMI
Zero suppression	B8ZS
Equalization	1 to 655 feet (distance from cross-connect), 5 steps

ASYNCHRONOUS T1U (AT1U)

Framing formats	N/A (transparent)
Line coding	AMI
Zero suppression	B8ZS
Equalization	
Receive	Automatic line build-out (ALBO)
Transmit	0 dB, 7.5 dB, 15 dB, 22.5 dB

ELECTRONIC KEYPHONE SET (EKS) OPTIONS

Maximum loop length for powered phones (35 mA max.)	500 Ω DC loop resistance or < 20 dB @ 8 kHz at the network interface
Maximum loop length for locally powered phones (20 mA max.)	500 Ω DC loop resistance or < 20 dB @ 8 kHz at the network interface
Battery	
Loop powered – display	35 mA max. per line
Loop powered – no display	20 mA max. per line
Locally powered	20 mA max. per line
Loop current detection threshold	Must detect > 4.3 mA Must not detect < 1.7 mA
Loop current, 52.0 Ω Volt battery	38 mA max. into Telset

DSC COMMUNICATIONS

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Litespan-2000 Specifications

TYPES OF SERVICES

4-wire	ISDN
800 service line	Off-premises extension
800 service trunk	Off-premises station
AFOD	P-phone (Meridian Business Set)
Centrex lines	PLIX tie line
Consolidation of SLC-96 mode 1	PBX switching
Consolidation of SLC-96 mode 3	POTS
Consolidation of SLC Series 5-Feature Package II	Private network T1 transport
Dial tone first code	Sequential line
DID	Voice data type 1
Digital data services (DDS)	Voice data type 2
DLC transport	Voice data type 3
Fractional T1	WATS line 2-way
FX lines and trunks	WATS line one
Hicap T-1 transport	WATS trunk 2-way
Interoffice T-1	WATS trunk one
Intraoffice T-1	Private line automatic ring down (PLAR)
	DC alarms

ENVIRONMENTAL CONDITIONS (PER TR-057)

Temperature	-40° to +65°C
CO & RT	(-40° to +150°F)

PHYSICAL MEASUREMENTS

Rack assembly	Height	213 cm (7 ft)
	Width	66.7 cm (26 in.)
	Depth	30.5 cm (12 in.)
Outdoor cabinet	Height	152.4 cm (60 in.)
	Width	208.2 cm (82 in.)
	Depth	104.2 cm (41 in.)

BELLCORE COMPLIANT

The Litespan-2000 and Litespan systems are designed in compliance with the following major Bellcore Standards.

Operations Technology Generic Requirements (OTGR)

TR-TSY-000008
TR-TSY-000057
TR-TSY-000253
TR-TSY-000303
TR-TSY-000386
TR-TSY-000909

OPTICAL INTERFACE

Fiber	Single-mode
Connectors	FC/PC, or customer-specified
Wavelength	1310 ± 30nm
Format	SONET

DS1 INTERFACE

DSX-1	Up to 56 DS1 positions available per channel bank
Line code	HDB3, B8ZS
Framing formats	SF (D4, SLC-96), ESF
Alarm monitoring	RCV frame slips, AIS, ESF, CRC, Yellow, RPVI

T1 INTERFACE

T1 SPAN	Up to 56 T1 positions available per channel bank
Line code	HDB3, B8ZS
Framing formats	SF (D4, SLC-96), ESF
Alarms monitoring	RCV frame slips, AIS, ESF, CRC, Yellow, RCVs
Line powering of span voltage	-130 Vdc
Current	60 mA
Line build out (XMT)	7.5, 15, 22.5 dB @ 772 kHz
Line build out (RCV)	ALBO

POTS

Capacity	Up to 224 lines per channel bank 4 lines per POTS card
Loop resistance	1950 ohms (including set)

CDSN

Capacity	Up to 224 lines per channel bank 4 lines per coin card
Loop resistance	1750 ohms (including telephone set) Dial tone first/coin first

UVG (UNIVERSAL 2-WIRE)

Capacity	Up to 224 lines per channel bank 4 lines per UVG card
Loop design	Carrier serving area rules Loop start/ground start Loop reverse battery

EQUALIZED UNIVERSAL VOICE GRADE (EUVG)

Characteristic	Impedance	Min. (dB)	Max. (dB)
XMIT TLP	600Ω	-9.0	+1.0
	900Ω	-9.0	+1.0
RCV TLP	600Ω	-6.0	+6.0
	900Ω	-6.0	+6.0

UNIVERSAL 4-WIRE (UEW)

4-wire impedance	Provisionable for 150, 600, or 1,200 ohms
programmable gain	0.1 dB steps over a 24.5 dB range
signaling mode	FXS, FXO, DX
4-wire X & M (EM4) signaling modes	EM4 modes 1 to V Trunkless modes I and II PLR (pulse link repeater) Modes I and II
4-wire impedance	600 ohms
programmable gain	0.1dB steps over a 24.5 dB range
signaling leads	X, M, SG, SB

OFFICE CHANNEL UNIT DATA PORT (DCUDP)

Data rates	2.4, 4.8, 9.6, 19.2, 56 or 64 kbps
Loopback types	OCU, CSU, DSU, and customer-controlled far-end loopback
Provisioning options	Secondary channel, customer data error correction

DSO DATA PORT (DSODP)

Primary Channel Rates	Secondary channel rates
2400	133.3
4800	266.6
9600	533.3
19200	1066.6
56000	2666.6
64000	Secondary channel not available

BASIC RATE INTERFACE UNIT (BRIU)

Data formats	2B+D, B1+D, B2+D, or D only
DSL data formats	2B1Q
Bit error rate	<10⁻⁷ for loops 0 and 2-15 with all impairments

ASYNCHRONOUS DS1U (ADS1U)

Framing formats	N/A (transparent)
Line coding	AMI
Zero suppression	B8ZS
Equalization	1 to 655 feet (distance from cross-connect), 5 steps

ASYNCHRONOUS T1U (ATTU)

Framing formats	N/A (transparent)
Line coding	AMI
Zero suppression	B8ZS
Equalization	
Receiver	Automatic line build-out (ALBO)
Transmit	0 dB, 7.5 dB, 15 dB, 22.5 dB

ELECTRONIC SERIES SIX (ESS) (P-PHONES)

Maximum loop length for powered phones (28 mA max.)	500 Ω DC loop resistance or < 20 dB @ 8 kHz at the network interface
Maximum loop length for locally powered phones (20 mA max.)	500 Ω DC loop resistance or < 20 dB @ 8 kHz at the network interface
Battery	
Loop powered – display	28 mA max. per line
Loop powered – no display	20 mA max. per line
Locally powered	20 mA short per line
Loop current detection	
Threshold	Must detect > 4.5 mA Must not detect < 1.7 mA
Loop current, 52.0 Ω Volt battery	28 mA max. into Telset

DSC COMMUNICATIONS

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LSP2000-A97

Support for Advanced Services

Ensuring Efficient Support for Advanced Services

Hatfield makes several erroneous assertions regarding the network design specifications of the BCPM3, and the capabilities of the DSC Litespan-2000 subscriber carrier system:

Assertion: The CSA concept is old and outdated.

Fact: While the CSA concept was developed in the early 1980s, it is the concept currently used in all modern network design and construction to assure universal network connectivity. As apparent in the DSC product literature (see example below dated 1997), all modern telecommunications equipment is designed around the parameters of the CSA design standard.

Assertion: Use of the "REUVG" line card—The Hatfield ex parte seems to imply that BCPM3 always uses the more expensive REUVG line card.

Fact: For most customer applications BCPM3 uses the more economical RPOTS line card. BCPM3 only uses the extended range line card (REUVG) when the CSA parameters are exceeded, as contained in the network design guidelines provided by the manufacturer (see below).

Assertion: Range of the RPOTS card—The Hatfield ex parte claims that the RPOTS card will function effectively out to a range of 17.6 kft.

Fact: This is directly contradicted by the clear and unambiguous language in DSC Practice OSP 363-205-010 issued July 1997 (at page 42):

> ***5.3.1 Loop Plant Design***
>
> *In most cases, the copper pair narrowband (voice) cables between the RT and the customer premises will conform to the CSA concept. CSA design rules can be found in* Narrowband Services Application Guide, *OSP 363-205-110. These design rules call for nonloaded pairs (22, 24 or 26 gauge wire) with a maximum physical range of 12,000 feet (including bridged tap) or 750 ohms conductor*

loop resistance, whichever comes first. In the case of 26 gauge wire, this equates to a maximum loop range of 9,000 feet. Any combination of two gauges is permitted. Today the CSA design rules ensure quality 2-wire voice transmission and the capability to support advanced digital services, including repeaterless digital data service (DDS), ISDN basic rate transmission (2B+D), high-bit-rate digital subscriber line (HDSL), and asymmetrical digital subscriber line (ADSL).

5.3.2 Extended CSA Design/CDO Replacement

There are applications of the Litespan system where it is necessary to serve customers more distant than 12,000 feet (beyond CSA rules) from the RT. Economy often requires a 33% increase in length in nonloaded CSA loops, including bridged taps. Litespan's extended CSA is 12,000 ft using 26 gauge wire and 16,000 ft using heavier gauge wire. CDO replacements mean loaded and longer cable pairs are possible. While Litespan -48 VDC channel units are capable of supervising a 1500-ohm maximum loop resistance line, all loops over 18,000 ft should be loaded, using standard H88 loading rules. The insertion loss at 1 kHz for extended CSA/CDO length loops exceeds common practice and approaches 10 dB, including a 2-dB loss in the Litespan RPOTS channel unit. It is strongly recommended, therefore, that RUVG2 or REUVG channel units be used in any Litespan RT that may be serving any loops longer than 750 ohms. With the REUVG channel unit, loops may be extended even farther with better 1-kHz loss. Also, there is matched precision balance and equalization automatically for high frequency (3kHz) rolloff, allowing nonloaded designs to 18,000 feet and loaded designs from 18,000 ft to 42,000 ft.

Thus, the BCPM3 follows the manufacturer's recommended design specifications while the Hatfield 5.0 does not.

Regarding the cost of the "RUVG2" line card, while Hatfield correctly states that the REUVG card is twice as costly as the RPOTS card, they fail to mention the cost of the RUVG2 card. Based on prices paid for these three types of cards by the BCPM sponsors, the RUVG2 card is significantly higher than the RPOTs card but less than the REUVG card, however, the REUVG provides additional features and functionality.

Of particular significance is the fact that the Hatfield 5.0 always uses the RPOTS card (Hatfield 5.0 regularly designs loops of up to and over 18,000 ft) even when the manufacturer "strongly recommends" one of the extended range cards for all loops over 750 ohms.[2] The BCPM sponsor's transmission engineers have selected the REUVG card for use in our "real" networks (as well as for use on extended range loops in the BCPM3) because for the modest increase in cost, it provides superior performance and significantly greater flexibility in application. If the Commission feels, after careful technical evaluation, that the RUVG2 is the better choice, then this adjustment can be easily made through a simple change in the BCPM3 input tables.

[2] As documented in the BCPM sponsor's ex-parte filing of October 8, 1997, DSC lists the maximum "practical" loop length at 1000 ohms.

deployed as any other unrestricted channel unit. If the average is greater than 5, Worksheet PW-1 and the factor for 7 repeaters is used.

5.3 CSA Transport Planning

A Litespan RT will ordinarily be located to serve distribution areas that make up a carrier serving area (CSA). If POTS and locally switched ground-start circuits (PBX-CO trunks) services are to be served exclusively through the pair-gain cables and need not operate on parallel copper feeders, then loops beyond the RT site can be rolled over with care up to an 18,000 foot extended CSA. This assumes RUVG2 is used throughout to provide, in this case, extended CSA or community dial office (CDO) replacement (see Section 5.3.2). Because the Litespan RT can also act as a hub for transporting or consolidating older DLC systems (SLC-96, SLC-Series 5), it may be advantageous to locate the Litespan RT in a site that allows for extension of T1 spans to remote terminal sites beyond.

5.3.1 Loop Plant Design

In most cases, the copper pair narrowband (voice) cables between the RT and the customer premises will conform to the CSA concept. CSA design rules can be found in *Narrowband Services Application Guide*, OSP 363-205-110. These design rules call for nonloaded pairs (22-, 24-, or 26-gauge wire) with a maximum physical range of 12,000 feet (including bridged tap) or 750 ohms conductor loop resistance, whichever occurs first. In the case of 26-gauge wire, this equates to a maximum loop range of 9,000 feet. Any combination of two gauges is permitted. Today the CSA design rules ensure quality 2-wire voice transmission and the capability to support advanced digital services, including repeaterless digital data service (DDS), ISDN basic rate transmission (2B+D), high-bit-rate digital subscriber line (HDSL), and asymmetrical digital subscriber line (ADSL).

5.3.2 Extended CSA Design/CDO Replacement

There are applications of the Litespan system where it is necessary to serve customers more distant than 12,000 feet (beyond CSA rules) from the RT. Economy often requires a 33% increase in length in nonloaded CSA loops, including bridge taps. Litespan's extended CSA is 12,000 ft using 26-gauge wire and 16,000 ft using heavier gauge wire. CDO replacements mean loaded and longer cable pairs are possible. While the Litespan -48 VDC channel units are capable of supervising a 1500-ohm maximum loop resistance line, all loops over 18,000 feet should be loaded, using standard H88 loading rules. The insertion loss at 1 kHz for extended CSA/CDO length loops exceeds common practice and approaches 10 dB, including a 2-dB loss in the Litespan RPOTS channel unit. It is strongly recommended, therefore, that RUVG2 or REUVG channel units be used in any Litespan RT that may be serving any loops longer than 750 ohms. With the REUVG channel unit, loops may be extended even farther with better 1-kHz loss. Also, there is matched precision balance and equalization automatically for high-frequency (3 kHz) rolloff, allowing nonloaded designs to 18,000 ft and loaded designs from 18,000 to 42,000 ft.

The RANI channel unit, available with Release 7.1, offers some of the RUVG2 capabilities and is an alternative to RPOTS without the 2-db loss restriction. Refer to the *Narrowband Services Application Guide*, OSP 363-205-110, for more information.

5.4 DSX-1 and T1 Span Extensions

A Litespan system is capable of delivering DS1 (1.544 Mb/s) services directly from the channel bank via the DS1U, ADS1U, T1U, and AT1U channel units. DS1-rate channel units may be located at the COT or RT and use the same physical slots as the narrowband channel units. In planning for the extension of DS1-rate facilities, certain design guidelines must be observed. These guidelines are familiar to engineers who have designed optical multiplexers and digital loop carrier systems into the telephone network.

Switching

Switching - Forward-Looking Placement of Host, Remote, and Standalone Switches

Assertion: The Hatfield Model Sponsors (HMS) heavily criticize BCPM3's use of LERG data as a starting point for determining the placement of host, remote, and standalone switches. They claim that "current configurations of switches as hosts, remotes, and standalones may no longer be optimal."

Fact: The HMS, however, offer no evidence that the LERG relationships are not optimal, and offer no alternative to the LERG relationships. The HMS themselves, in previously filed comments, contend that to programmatically create these relationships would be impossibly complex.

The BCPM Sponsors believe that detailed analysis of the inputs, such as the LERG data, is not appropriate for this platform selection proceeding. However, the use of the LERG allowed the BCPM sponsors to create a robust model that specifically calculates the costs of hosts, remotes, and standalone switches. This test data allowed the modelers to verify the correct and reasonable operation of the platform with real world data. The HM 5.0, by contrast, contains no attempt to reasonably differentiate hosts, remotes, and standalones. We emphasize that users of BCPM3 have the ability to change the data from the LERG database at will. In summary, BCPM3 offers thoroughly-developed, specific models for host, remote, and standalone switches, along with a current, verifiable data set to define their efficient placement. HM 5.0, by contrast, is little more than a "glorified typewriter", offering little more than a means to type in numbers and report them. It has not been tested and verified by real world data, and its performance with such data is completely unpredictable.

Assertion: The HMS state that BCPM3 "requires the use of current LERG-indicated status of switch counts by wire center..."

Fact: This is completely untrue. The BCPM3 Switch Module does not accept data input for individual switches within a wire center, nor does it accept any input for the number of switches in a wire center. BCPM3 takes the total number of switched *lines* in each wire center

and calculates the number of switches needed based on the line counts and traffic characteristics.

Assertion: The HMS cite a Washington, DC, wire center example in which the LERG records show two 1AESS switches, a 5ESS switch and remote, and an unidentified digital switch. The HMS claim that BCPM3 would "place either 5ESS or DMS switches in this wire center as substitutes for the 1AESS switches, and it would place a now superfluous 5ESS remote as well!"

Fact: The example is absolutely untrue and irrelevant because BCPM3 does not use the switch model (such as 1AESS) as input. For this example, the only relevant inputs are the number of switched lines in the building the host/remote standing of the *primary* switch in the building, which in this case is a digital host or standalone office. BCPM as default assumes an equal likelihood of a Nortel or Lucent switch; specific vendor identification is provided only by the end user.

Although data inputs are not the purpose of this proceeding, we shall respond to the HMS statement that BCPM does not provide data to allow the user to determine whether a range of modern remotes is represented. The ALSM runs that formed the basis for the initial switch curve were based on the most current generics available. The regression model for remotes included more than one hundred remotes of over 5000 lines. By contrast, the "blended" switch cost function in the HM cannot be verified to include any remotes at all!

Switching - Use of Proprietary Models

Detailed discussion of the switching cost inputs is not appropriate at this platform selection stage for cost proxy models. As stated previously, the BCPM Sponsors welcome the inclusion of switch investment data from other companies as part of the input selection process. We stand by our position that the Audited LEC Switching Models (ALSMs) provide the best source of *forward looking* switch investment information. The models can specifically identify the amount of line port investment for each subscriber line. The functional switch partitioning afforded by these models is critical to the accurate determination of universal service investments, as the BCPM

Sponsors explained previously in their Joint Comments on platform design dated August 8, 1997. The Hatfield Model, by contrast, applies a completely arbitrary and unsupported allocation factor to the entire switch cost to create a universal service "investment."

During the input selection stage, we shall welcome the review of the ALSM inputs that form the basis for the switch regression model. While such review will require considerable diligence, it will provide investment results far more meaningful than the arbitrary allocations advocated by the HMS.

Switching - Consistency of Input Values

Detailed discussion of the switching cost inputs is not appropriate at this platform selection stage for cost proxy models. However, the BCPM Sponsors are compelled to respond to several erroneous statements and suppositions by the HMS concerning inputs.

Assertion: The HMS make an unsubstantiated charge that the SCIS and SCM equipment partitioning is inconsistent based on the fact that BCPM allows the user to place the Excess CCS capacity into either the Usage of Port category.

Fact: The fact is the SCIS itself allows the user to place this Excess CCS capacity investment into either category. This feature was included to allow the BCPM user to place the investment into the category consistent with the user's Unbundled Network Element (UNE) studies.

The switch partitioning of the SCM and SCIS models was carefully analyzed for the initial switch curve development. The BCPM sponsors have created a mapping process that accurately, but not perfectly in every case, matches the SCIS and SCM inputs. There are more functional differences between switch technologies (5ESS and DMS) than the two models. In contrast, HM 5.0 makes no attempt whatsoever to address switch partitioning.

The use of an investment constant term for SS7 equipment results from the fact that SS7 SSP equipment requirements are relatively

easily identified, making the use of a sophisticated model unnecessary. This is evidence of the BCPM Sponsors' efforts to make the model as open and simple as possible, by using direct estimation where feasible.

The claim that "HM 5.0 is superior due to its use of consistent configurations" is curious given the hodgepodge of unsupported and arbitrary data inputs supplied with HM 5.0.

Switching - Validity of Modeled Cost Development

Detailed discussion of the switching cost inputs is not appropriate at this platform selection stage for cost proxy models. However, the BCPM Sponsors are compelled to point out where the HMS have apparently misunderstood and mischaracterized the switch regression process. The switch functional investment coefficients are the result of individual regression analyses run for each functional category. As a result, the HMS statement that the individual inputs could be colinear is irrelevant to the functional category regression development. The BCPM regression model looks at the individual investment buckets and does not rely upon the regression process to perform the partitioning, as the HMS have assumed. All one has to do is compare the regression results to actual ALSM results, an exercise easily accomplished with BCPM, to verify that the regression model closely approximates the ALSM partitioning, as well as total investment levels.

Switching - Cost Allocation Issues

In general, the cost allocation "issues" that the HMS identify result from the fact that BCPM3 does attempt to make meaningful allocations of switch investments to functional categories, as contrasted with HM 5.0, which simply makes an arbitrary, unsupported allocation of total switch investment to universal service.

Assertion: The HMS claim that "if a remote is attached to a host, but belongs to a different rate center, BCPM excludes that remote for allocating the host's processor."

Fact: This statement is entirely untrue, as can be easily verified by reviewing the main logic section of the BCPM Switch Module. In BCPM3, the host processor-related investment is allocated to the host and all of its remotes, both within and outside the host rate center, based on the number of busy-hour calls in the host and each remote.

Assertion: The HMS claim the "Hatfield correctly models the entire host/remote complex and allocates all the investments and expenses evenly over all host/remote lines."

Fact: This claim is unfounded because the HM 5.0 switch curves do not make any meaningful, supportable differentiation between hosts and remotes.

BCPM assigns a portion of processor costs to features because, clearly, vertical services and their associated costs are not considered part of universal service. By not identifying and setting aside feature processor usage, HM 5.0 improperly assigns vertical service and feature investments to universal service.

Assertion: BCPM3's line to trunk ratio is incorrect.

Fact: The HMS, in their discussion of the Line Concentration Ratio (LCR), have confused the BCPM Line to Trunk Ratio with the LCR when they make this statement. The LCR defines the ratio of speech links to line terminations on the line side of the switch. The BCPM line to trunk ratio is used to calculate the number of *trunks* on each switch. One has nothing to do with the other in the context of the BCPM model. The LCR is not an input to BCPM; it is an input to the ALSM models that underlie the switch regression analysis.

The SCIS cost per terminating call cost category was assigned to the trunk functional bucket to ensure consistency between the SCIS and SCM functional mappings.

BCPM Sponsors' Response to AT&T/MCI Ex Parte "Scorecard" on Switching

- Forward-Looking Placement of Host, Remote, and Standalone Switches
- Use of Proprietary Models
- Consistency of Input Values
- Validity of Modeled Cost Development
- Cost Allocation Issues

January 15, 1997

Forward-Looking Placement of Host, Remote, and Standalone Switches

- Hatfield Model Sponsors' (HMS) claim: "current configurations of switches as hosts, remotes, and standalones may no longer be optimal."

Fact: LERG data is an efficient starting point for switch location.

Fact: HMS themselves claim that to programmatically determine host, remote, standalone locations on a forward-looking basis is not feasible (August 8 reply comments to the FNPRM).

Fact: The BCPM LERG data tables are easily examined and edited by the model user.

- HMS claim: BCPM3 "requires the use of current LERG-indicated status of switch counts by wire center…"

Fact: BCPM3 does not use any input, LERG or otherwise, defining switch counts by wire center. Switch counts are determined based on capacity constraints.

Forward-Looking Placement of Host, Remote, and Standalone Switches

LERG Input Table for Washington, DC

OCN	NAME	CLLI	HCLLI	RATE CENTER	Complex	ComplexID
9211	WASHINGTON	WASHDCACDS0		WSHNGTNZN1	WASHDCACDS0	1
9211	WASHINGTON	WASHDCBKCG0		WSHNGTNZN1	WASHDCBKCG0	2
9211	WASHINGTON	WASHDCBNCG0		WSHNGTNZN1	WASHDCBNCG0	3
9211	WASHINGTON	WASHDCCHDS0		WSHNGTNZN1	WASHDCCHDS0	4
9211	WASHINGTON	WASHDCDKDS0		WSHNGTNZN1	WASHDCDKDS0	5
9211	WASHINGTON	WASHDCDPDS2		WSHNGTNZN1	WASHDCDPDS2	6
9211	WASHINGTON	WASHDCFIDS0		WSHNGTNZN1	WASHDCFIDS0	7
9211	WASHINGTON	WASHDCGGDS0		WSHNGTNZN1	WASHDCGGDS0	8
9211	WASHINGTON	WASHDCGTDS0		WSHNGTNZN1	WASHDCGTDS0	9
9211	WASHINGTON	WASHDCLCDS0		WSHNGTNZN1	WASHDCLCDS0	10
9211	WASHINGTON	WASHDCMTDS0		WSHNGTNZN1	WASHDCMTDS0	11
9211	WASHINGTON	WASHDCSEDS0		WSHNGTNZN1	WASHDCSEDS0	12
9211	WASHINGTON	WASHDCSWDSA		WSHNGTNZN1	WASHDCSWDSA	13
9211	WASHINGTON	WASHDCWLDS0		WSHNGTNZN1	WASHDCWLDS0	14