DOCKET FILE COPY ORIGINAL

AT&T

Suite 1000
1120 20th Street, N.W.
Washington, DC 20036
202 457-3810

July 2. 1996

RECEIVED

JUL 2 1996

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

Mr. William F. Caton
Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, DC 20554

RE: Ex Parte Presentation
CC Docket No. 96-98

Dear Mr. Caton:

On July 2, 1996, at the Commission staff's request, a meeting was held at AT&T's offices to discuss the economic and engineering assumptions of the Hatfield TSLRIC model, as well as the logic underlying this model. Those present at this meeting included:

AT&T:	Richard Clarke. Mike Lieberman, Joel Lubin
Hatfield Associates:	Dick Chandler, Robert Mercer. John Donovan
Deloitte and Touche:	Tracy Wyman
FCC:	Anthony Bush, Bill Sharkey, Whitey Thayer, Tom Spavins, Doron Fertig, Robert Loube, Alex Belinfante. Thomas Koutsky, Louis Enriquez

Two copies of this Notice are being submitted to the Secretary of the FCC in accordance with Section 1.1206(a)(1) of the Commission's rules. Copies of the materials used in this presentation are also attached

Sincerely,

Richard N. Clarke

Attachments

cc: FCC addressee list

0+2

Overview

"Hatfield Model" first used in nationwide cost study in 1994

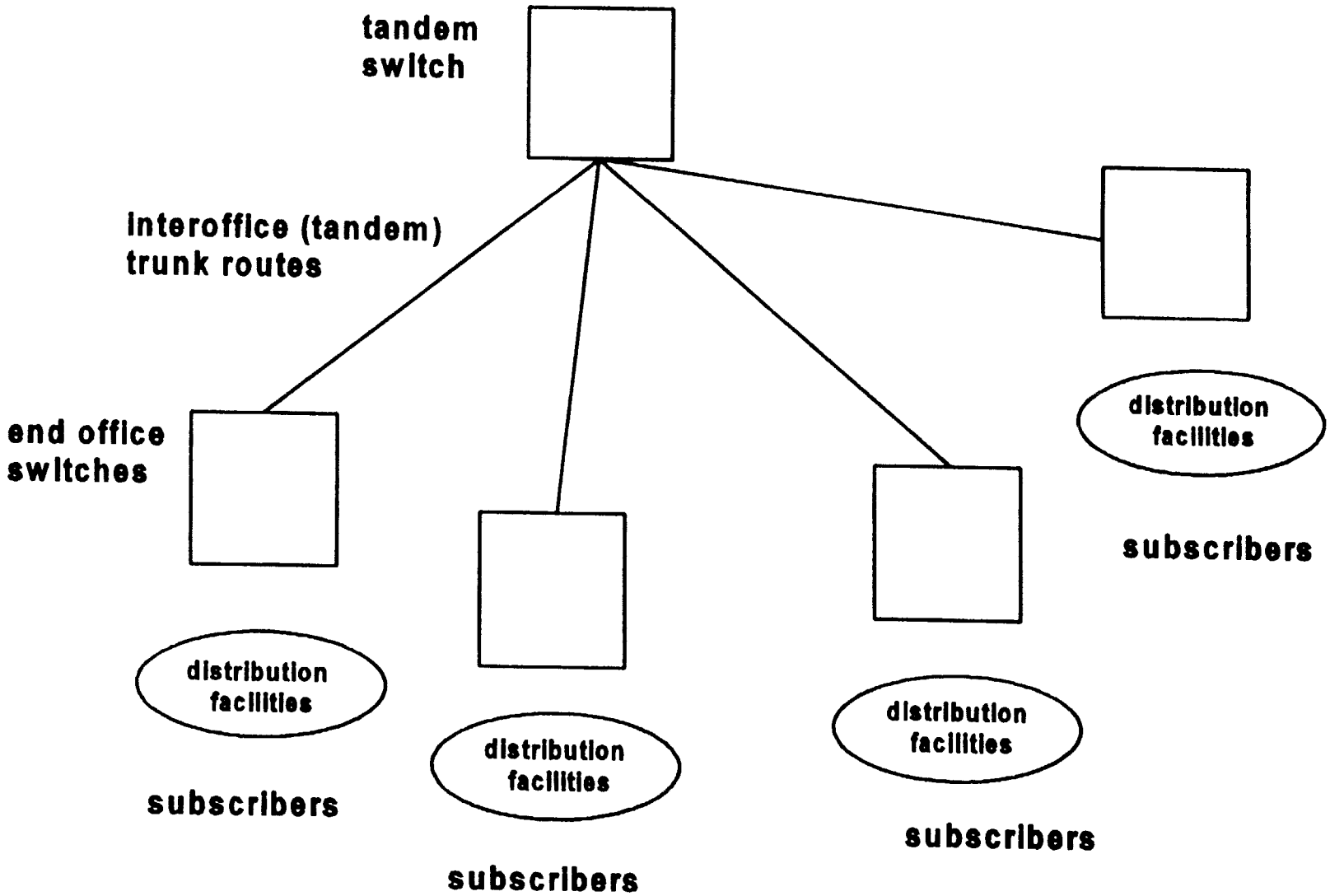
- used "green field" approach with TSLRIC methodology
- used "forward-looking" technologies
  - fiber feeder plant
  - digital loop carrier
  - digital switching
    - inputs included switch line and processor limits
    - subscriber inputs included traffic characteristics
- applied historical costs to calculated network investment
- used adjustable capital structure parameters to determine investment carrying costs

Overview

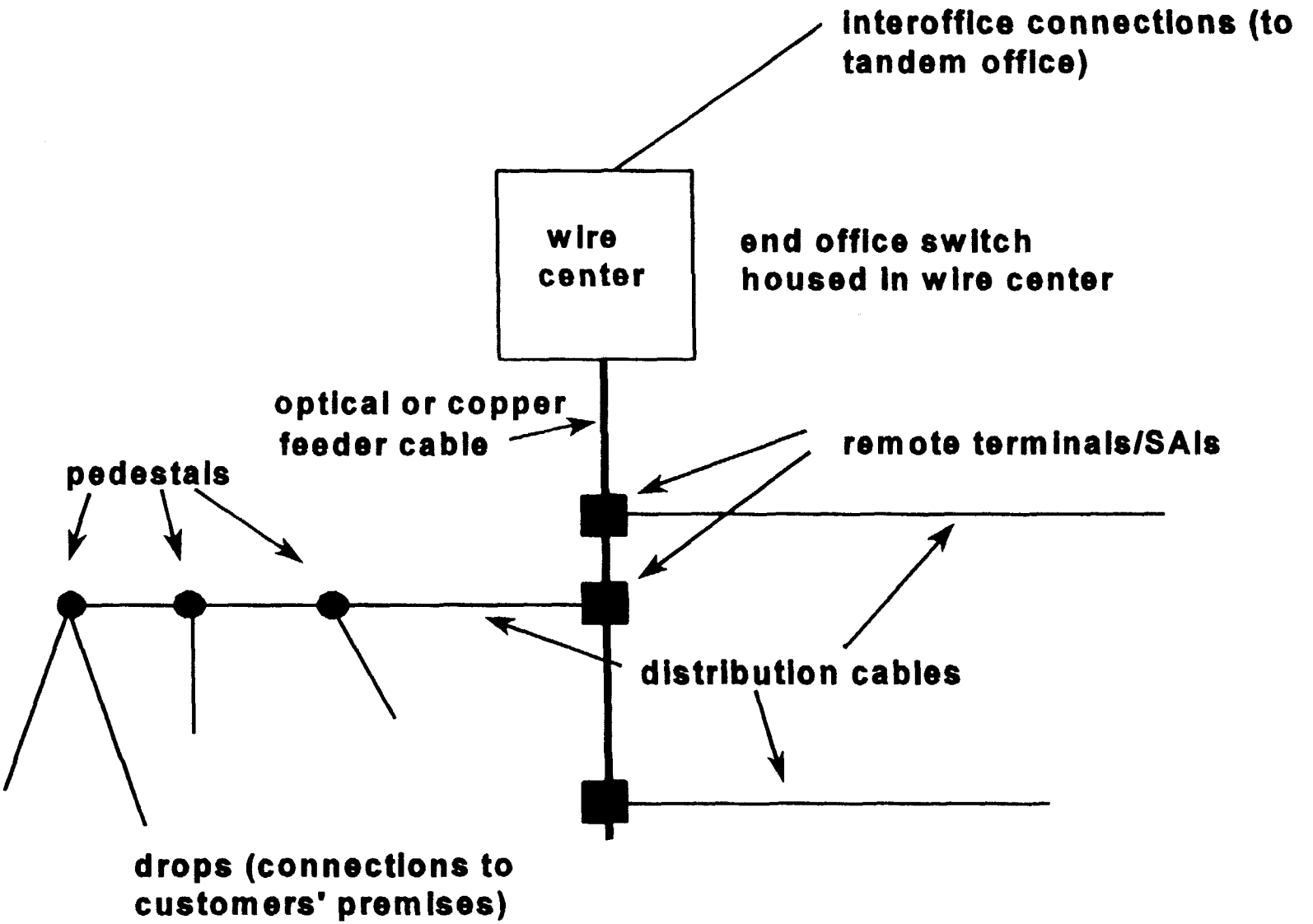
Hatfield Model evolved to include interoffice facilities

- local tandems
- tandem trunks
- STPs and signaling links

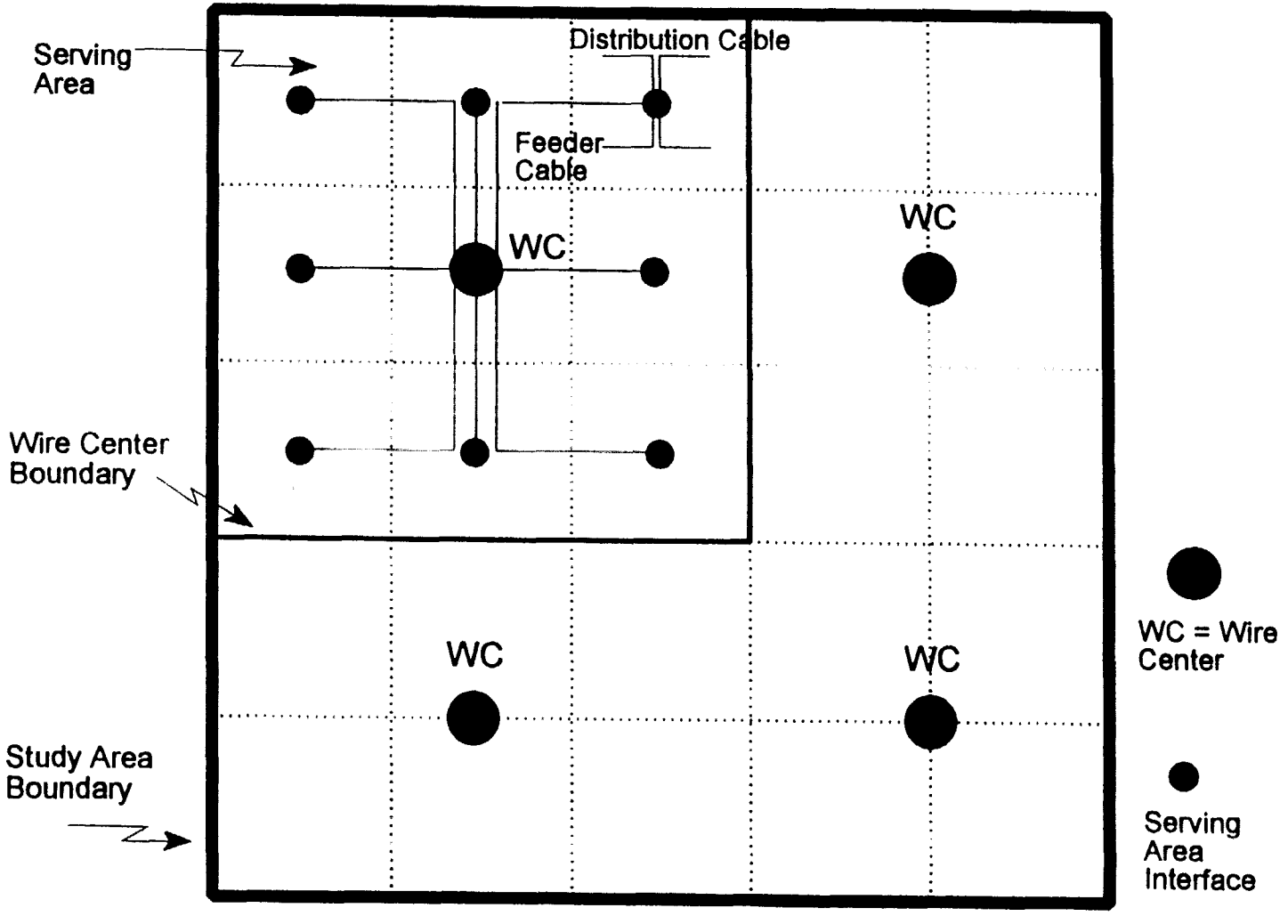
Local Exchange Network Structure



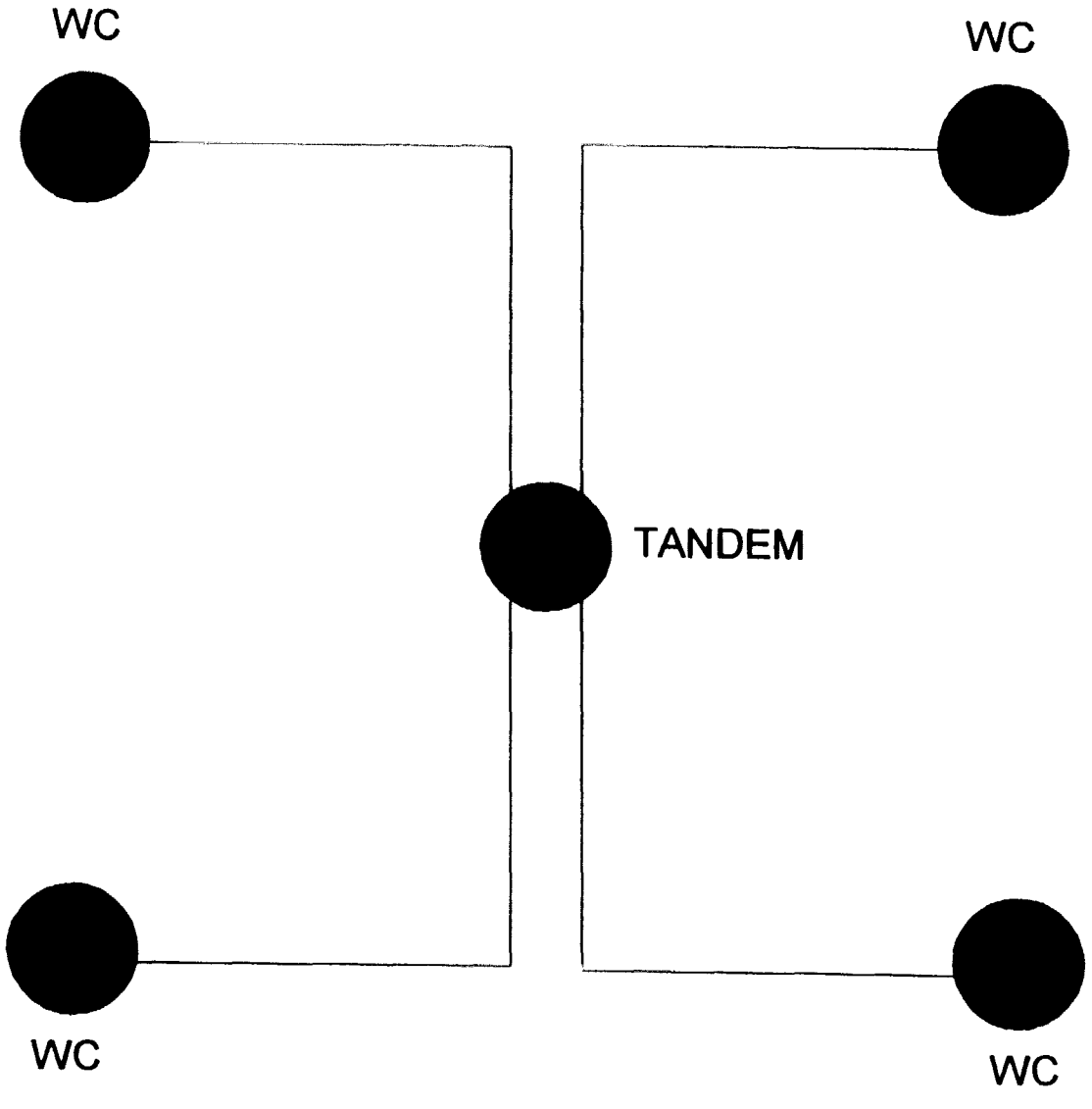
Distribution Network Structure



Distribution Network Model



Interoffice Network Model



Overview

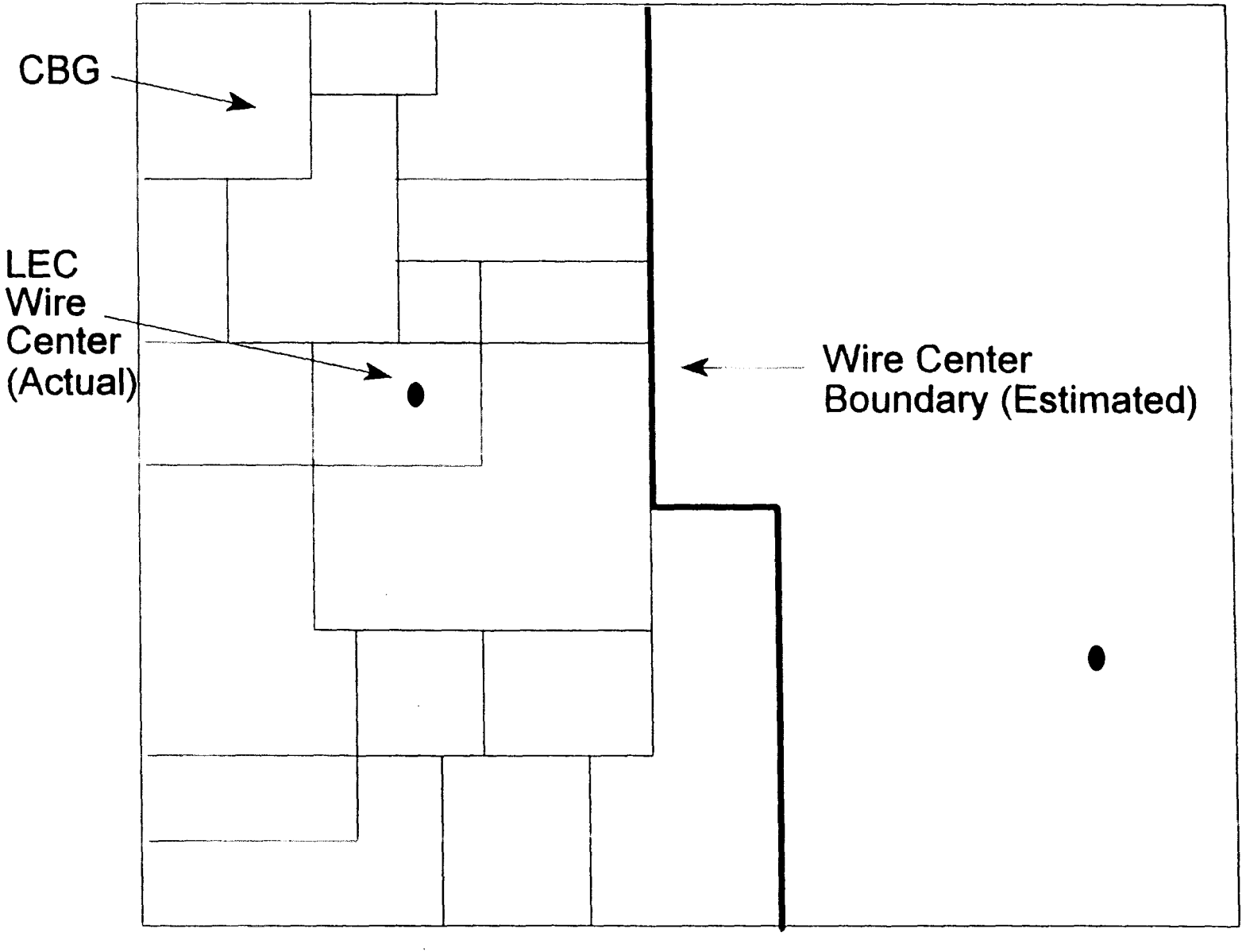
Development of BCM provides "scorched node" modeling approach

- BCM uses existing wire center locations to serve population in nearest Census Block Groups (CBGs)

HM2.2 employs BCM for loop investment calculations

HM2.2 retains all aspects of earlier versions at wire center level and higher

CBG ASSIGNMENT TO WIRE CENTERS



Hatfield Model Version 2.2

HM2.2 does not modify BCM

HM2.2 input module pre-processes BCM input data

- adds business and second residential lines to BCM household totals
- allows loop plant to be sized to accommodate all users

HM2.2 uses intermediate BCM output to compute loop investments by plant category (aerial, underground, DLC electronics)

HM2.2 uses separate wire center module to estimate wire center, end office switching, tandem switching, interoffice transmission, and signaling (SS7) investments

Hatfield Model Version 2.2

Combined loop and wire center investment components form basis for estimating network-related operating expenses as well as capital carrying costs

Historical expense data (ARMIS reports) used for network expense estimates

Recommended or authorized capital structure parameters used for determination of carrying costs for network capital investment

- debt/equity
- costs of debt and equity
- economic life by plant category

HM2.2/BCM differences

BCM equates households in CBGs with access lines

- does not accommodate business or additional residential lines
- business line multiplier of 1.75 used for switch sizing only

- loop plant undersized, especially in high-density areas

HM2.2 adds business and second residential lines

- multipliers applied according to population density range

BCM uses single switching model for end office switching investment

- includes high ($650,000) intercept investment; overstates switch investment in small wire centers

HM2.2 uses two-segment investment curve to address small and large end office switches

HM2.2/BCM differences

BCM does not include SAI (serving area interface), terminal, subscriber drop or NID (network interface device)

HM2.2 adds SAI, terminal, drop and NID

BCM does not include interoffice facilities

HM2.2 estimates tandem switch, tandem trunk, STP, and signaling link investments according to existing wire center and tandem/STP physical locations; model estimates representative distances for intraLATA, local direct, and access direct trunks

BCM uses single multiplier based on nationwide Tier 1 ARMIS reports to account for operating expenses and capital carrying costs

HM2.2 computes network expenses according to plant categories and historical ARMIS data and use specific capital structure parameters to estimate capital carrying costs

HM2.2 description

BCM input data pre-processing

Input module multiplies household count in each CBG according to density range

Multipliers adjusted to produce reported (ARMIS 43-08) total business and residential access lines

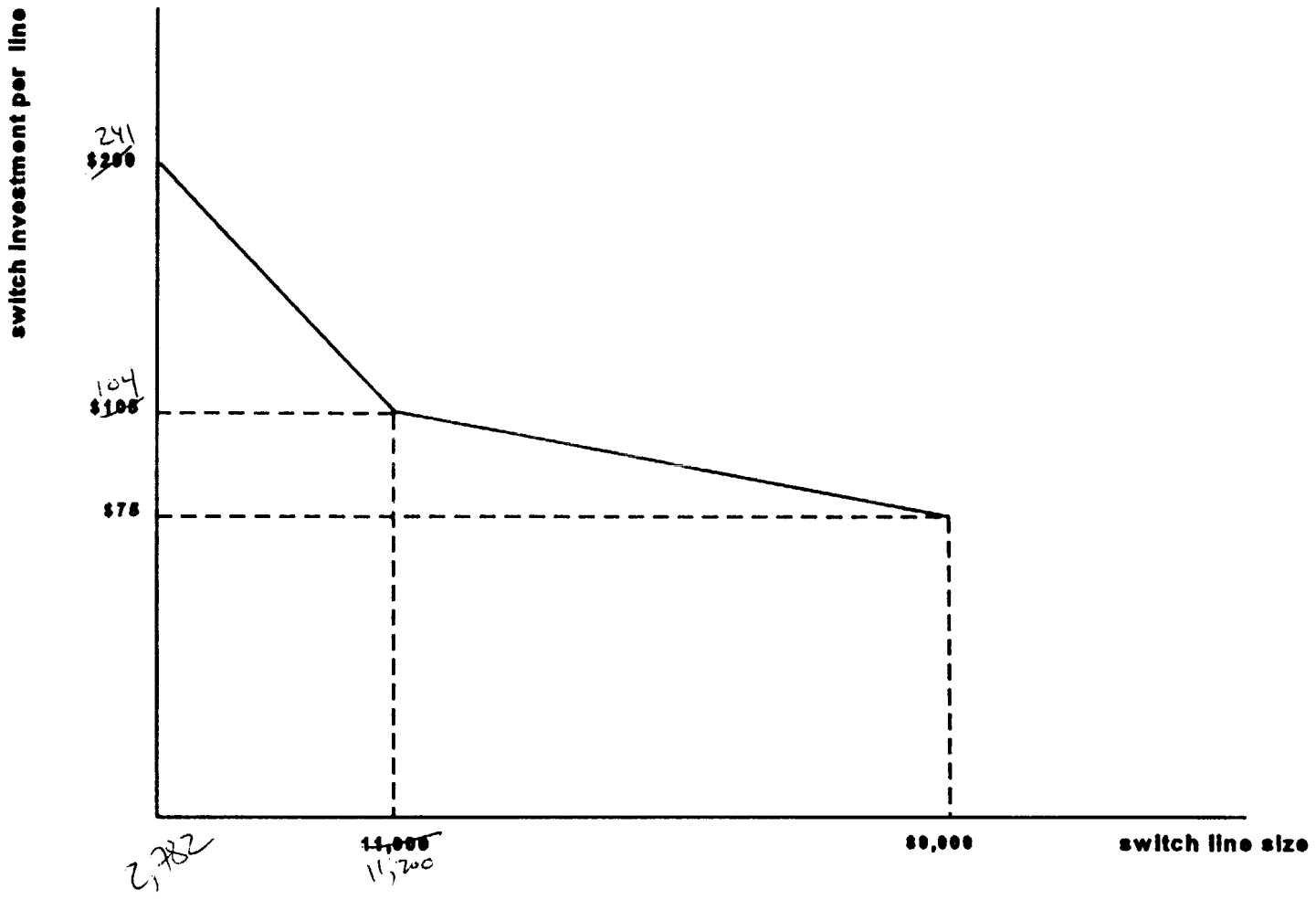
e.g.: Pacific Bell multipliers

range, pop/sq km	total multiplier	2nd res. fraction	bus. multiplier
0 - 10	1.30	0.10	1.20
10 - 100	1.55	0.15	1.40
100 - 500	1.80	0.20	1.60
500 - 1000	2.00	0.20	1.80
1000 - 5000	2.06	0.24	1.82
> 5000	2.08	0.25	1.83

HM2.2 description

End office switching investment determined by published average switch per-line investments and average end office line sizes

Model uses two-segment linear investment curve:


switch investment per line
241
$200
104
$105
$75
2,782
11,000
11,200
80,000
switch line size

HM2.2 extension descriptions

HM2.2 (wire center investment module) totals line counts in each wire center to produce per-line end office switching investment

- model applies installation multiplier and explicit wire center investment calculation to switch investment

HM2.2 (wire center investment module) uses end office, tandem, and STP switch locations derived from LERG (Local Exchange Routing Guide) to determine interoffice facility distances

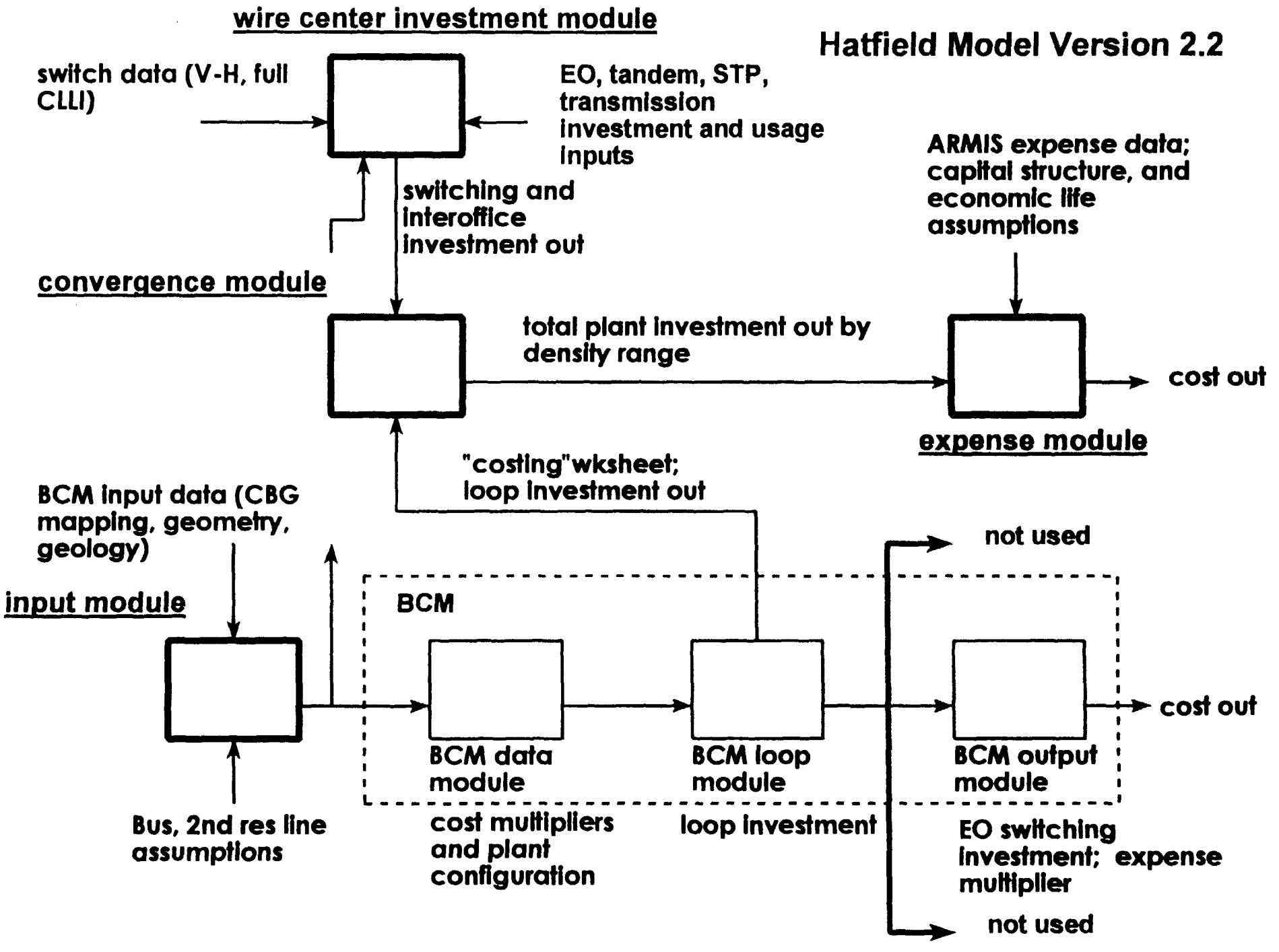
- model assumes existing tandem and STP locations
- model assumes rectangular facility routing to estimate distance (instead of using airline distance)

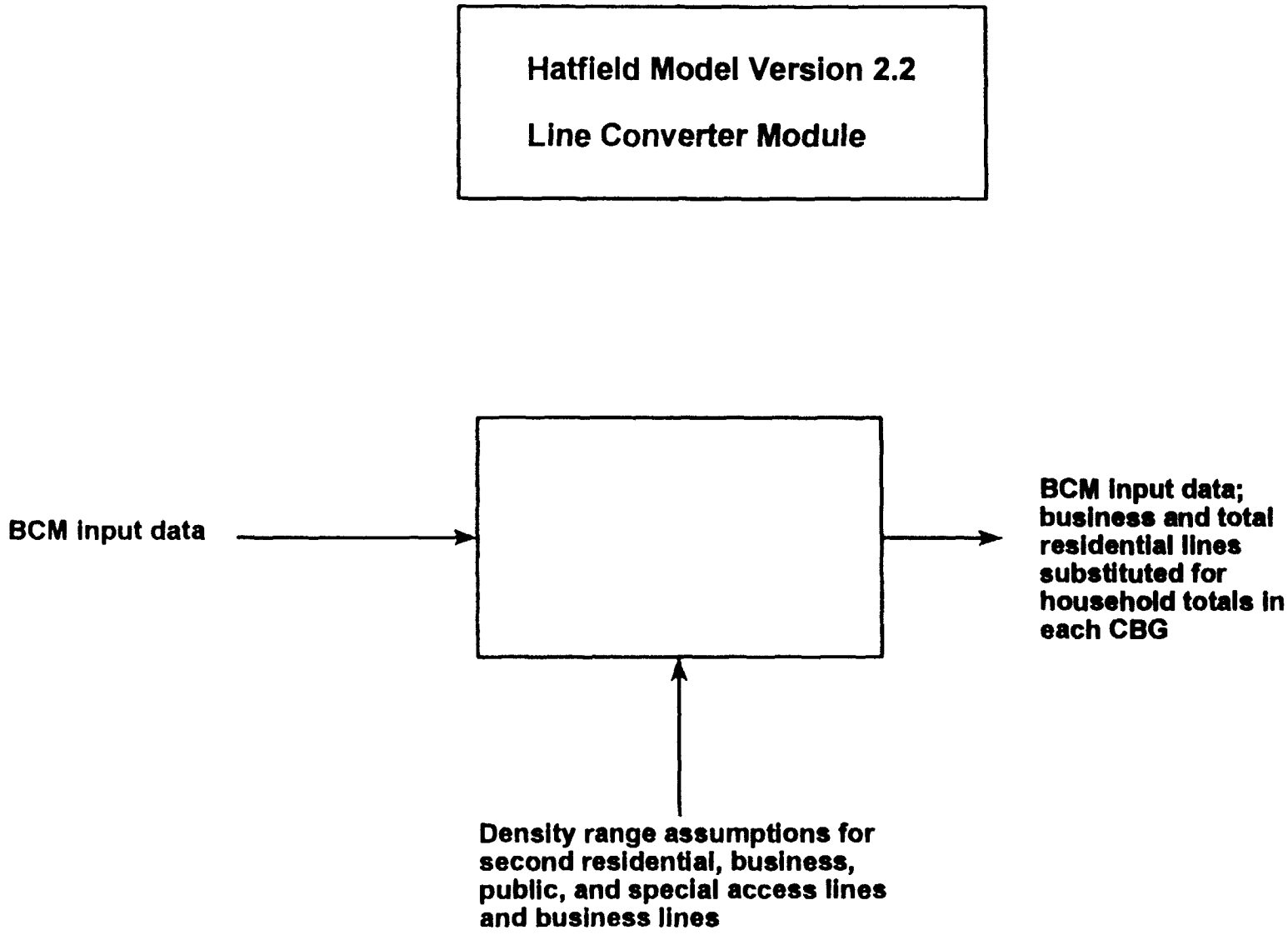
HM2.2 descriptions

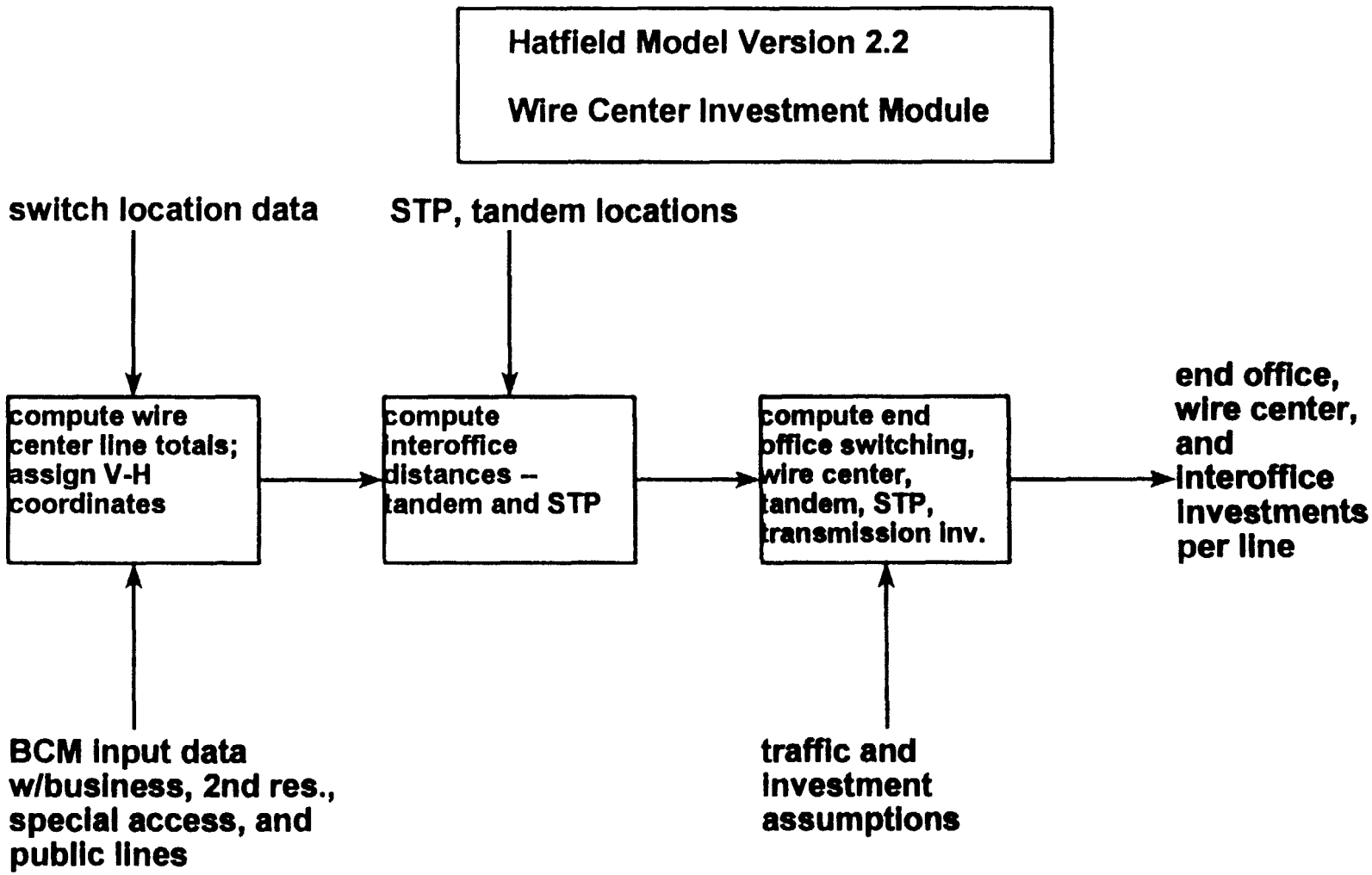
HM2.2 output module combines wire center investments with CBG loop investments and separates into plant categories

HM2.2 expense module uses output module investment totals to determine network-related expenses and capital carrying costs for network investment

- Expense factors derived from ARMIS data
- Capital carrying costs use prescribed capital structure constants
- Separate economic life assumptions for different plant categories
- Output results given for eleven BNFs

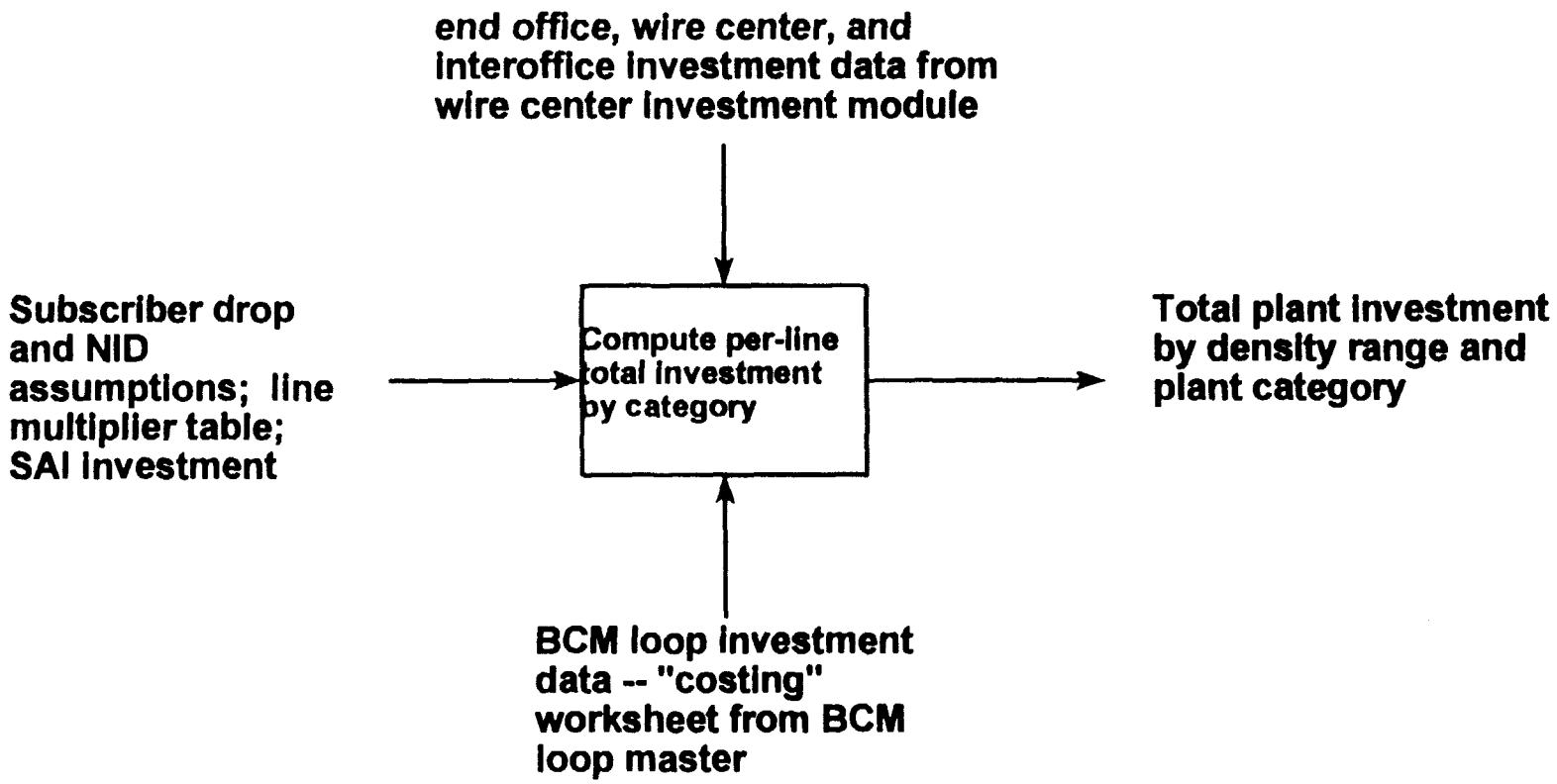

wire center investment module
Hatfield Model Version 2.2
switch data (V-H, full CLLI)
EO, tandem, STP, transmission investment and usage inputs
ARMIS expense data; capital structure, and economic life assumptions
switching and interoffice investment out
convergence module
total plant investment out by density range
cost out
expense module
"costing"wksheet; loop investment out
BCM input data (CBG mapping, geometry, geology)
not used
input module
BCM
cost out
BCM data module
BCM loop module
BCM output module
Bus, 2nd res line assumptions
cost multipliers and plant configuration
loop investment
EO switching investment; expense multiplier
not used

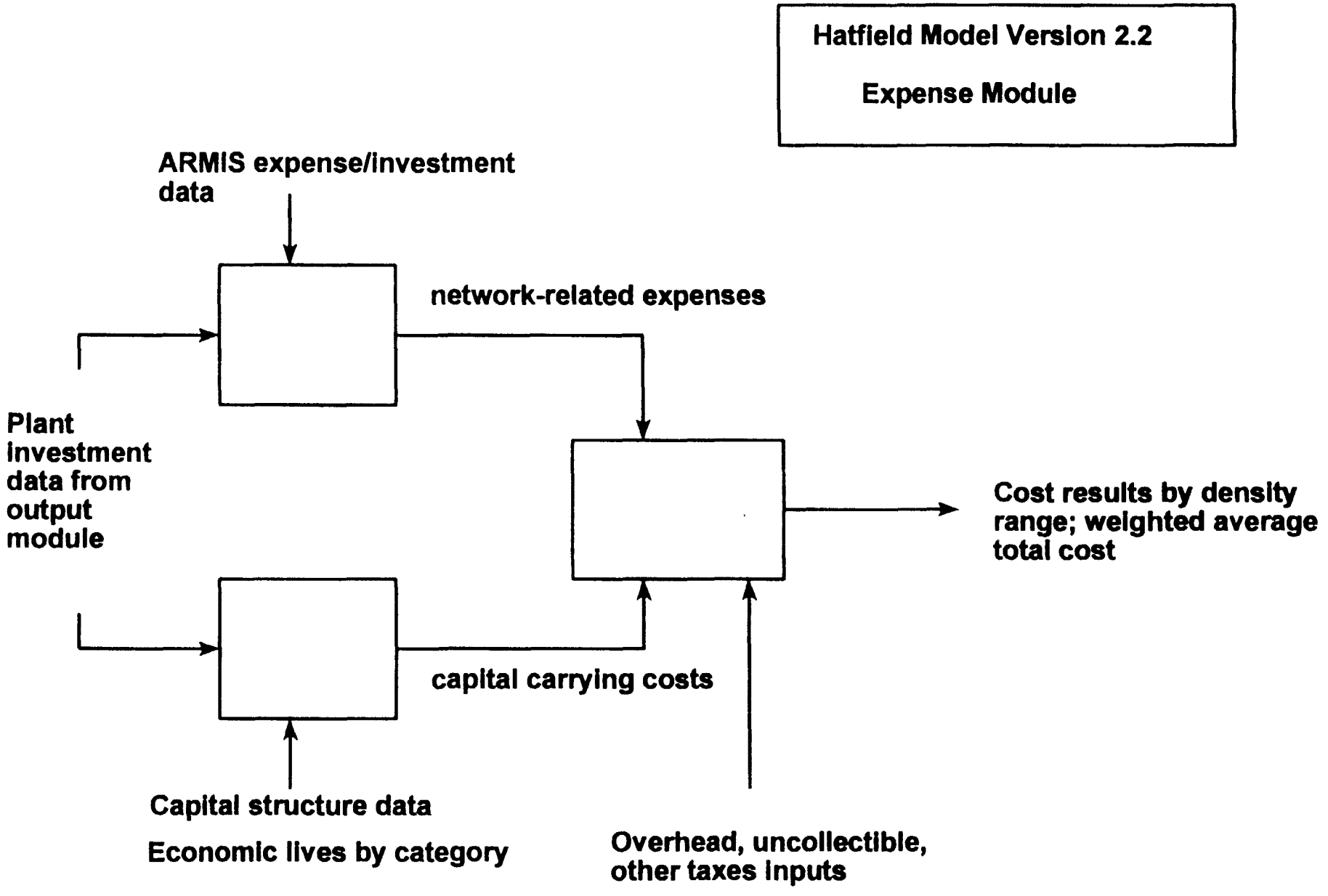

Hatfield Model Version 2.2
Line Converter Module
BCM input data
BCM input data; business and total residential lines substituted for household totals in each CBG
Density range assumptions for second residential, business, public, and special access lines and business lines


Hatfield Model Version 2.2
Wire Center Investment Module
switch location data
STP, tandem locations
compute wire center line totals; assign V-H coordinates
compute interoffice distances -- tandem and STP
compute end office switching, wire center, tandem, STP, transmission inv.
end office, wire center, and interoffice investments per line
BCM input data w/business, 2nd res., special access, and public lines
traffic and investment assumptions

Hatfield Model Version 2.2

Convergence Module




Hatfield Model Version 2.2
Expense Module
ARMIS expense/investment data
network-related expenses
Plant investment data from output module
Cost results by density range; weighted average total cost
capital carrying costs
Capital structure data
Economic lives by category
Overhead, uncollectible, other taxes inputs

XIII. APPENDIX D

SAMPLE MODEL INPUT/OUTPUT SHEETS

old version, for illustration only

Data: Raw CBG Data
Use: Input for Line Multiplier Module *(columns A - N)*
Source: Benchmark Cost Model (BCM)

A	B	C	D	E	F	G	H	I	J	K	L	M	N
CLLI	COMPANY NAME	CBG	QUADRANT	OMEGA	ALPHA	DISTRICT	TOTAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	WATER DEPTH
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070113019	1	351	9	3,614	481	1.734	277	49		STV-FSL	4.24
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070113021	1	11	11	7,913	406	0.369	1,100	49		STV-FSL	4.24
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070113011	1	326	34	10,338	519	0.297	1,749	49		STV-FSL	4.24
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070113029	1	5	5	10,526	267	1.203	222	49		STV-FSL	4.24
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070113022	1	340	20	11,421	576	0.317	1,816	49		STV-FSL	4.24
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070112005	1	326	34	12,260	214	0.069	3,109	49		STV-FSL	4.24
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070112004	1	320	40	12,624	455	0.159	2,855	55		SL	3.68
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070114013	2	76	14	6,424	365	1.034	353	43	HARD	STV-FSL	4.87
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070114012	2	47	43	7,173	471	0.952	495	49		STV-FSL	4.24
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070114019	2	121	31	9,144	667	3.044	219	49		STV-FSL	4.24
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070114014	2	56	34	11,479	483	1.158	417	58		FSL	4.19
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070114011	2	60	30	15,803	418	0.723	578	58		FSL	4.19
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070114029	2	110	20	17,114	839	4.713	178	43	HARD	STV-FSL	4.87
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070116001	3	221	41	6,400	285	0.906	314	49		STV-FSL	4.24
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070114032	3	148	32	10,370	1,390	1.539	903	43	HARD	STV-FSL	4.87
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070115009	3	170	10	13,374	1,006	3.982	253	49		STV-FSL	4.24
ASTNRIAN	NEW ENGLAND TEL CO - RI	440070115002	3	155	25	15,701	491	0.145	3,385	56		FSL	2.59

DRAFT
For Discussion Purposes Onl