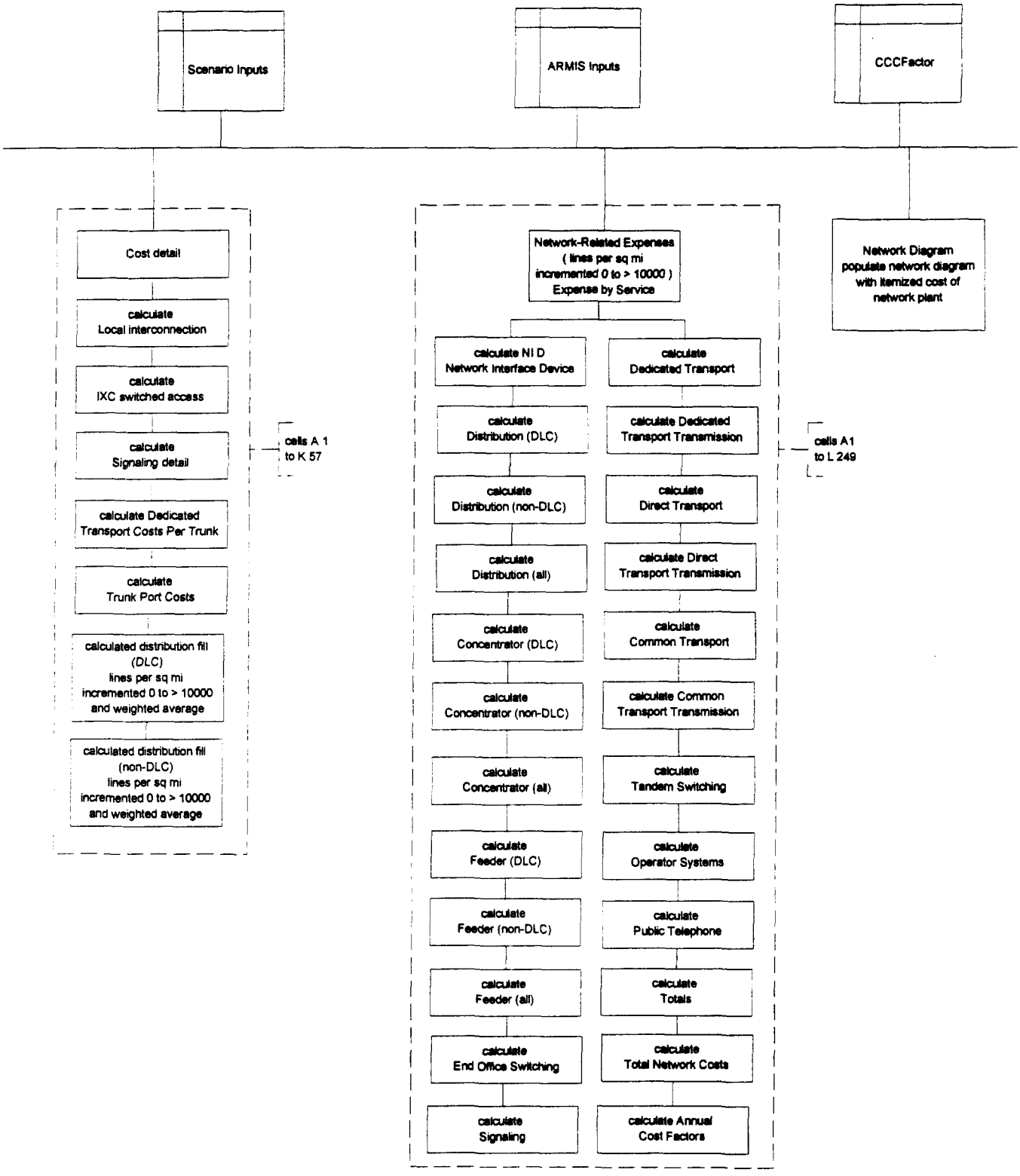
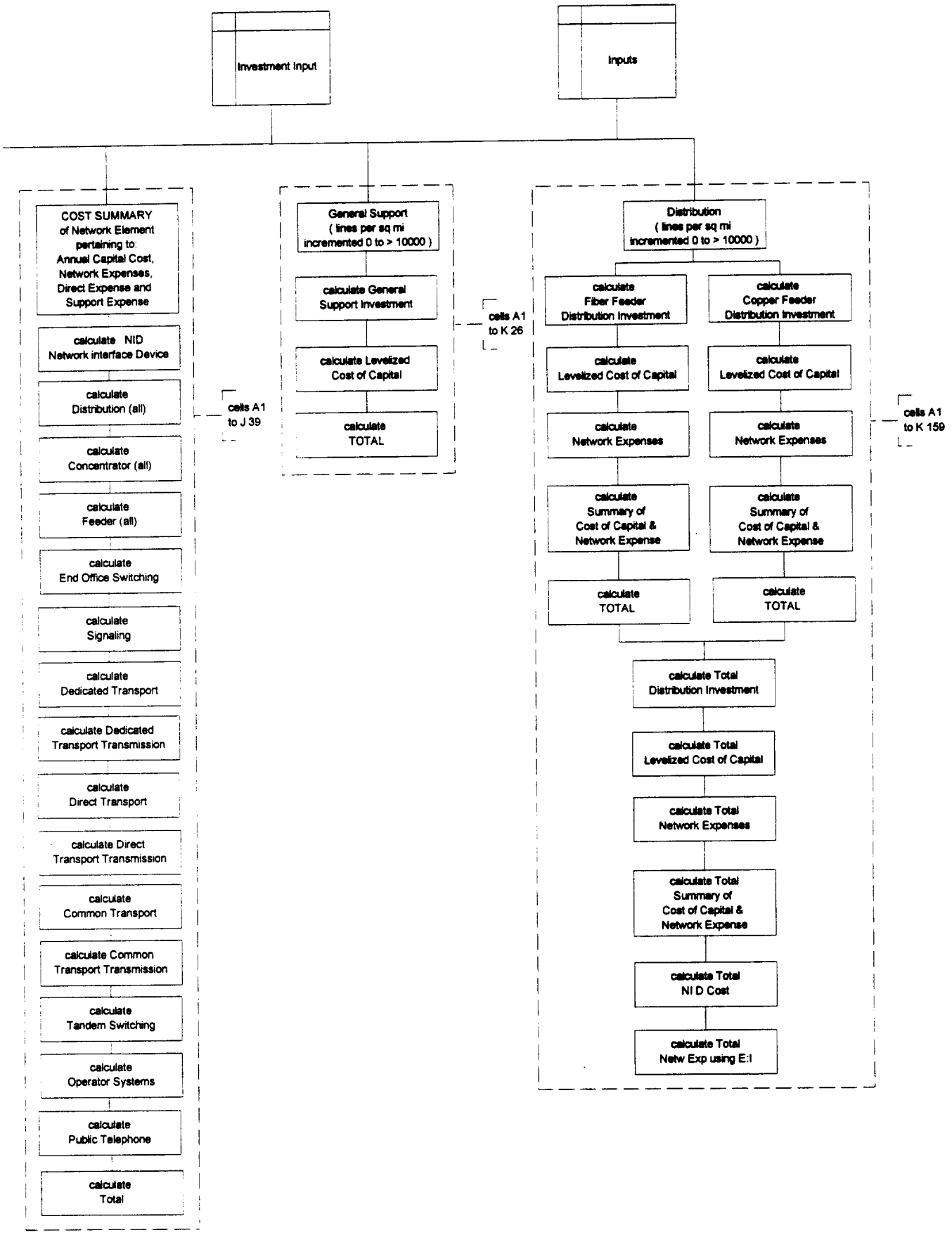
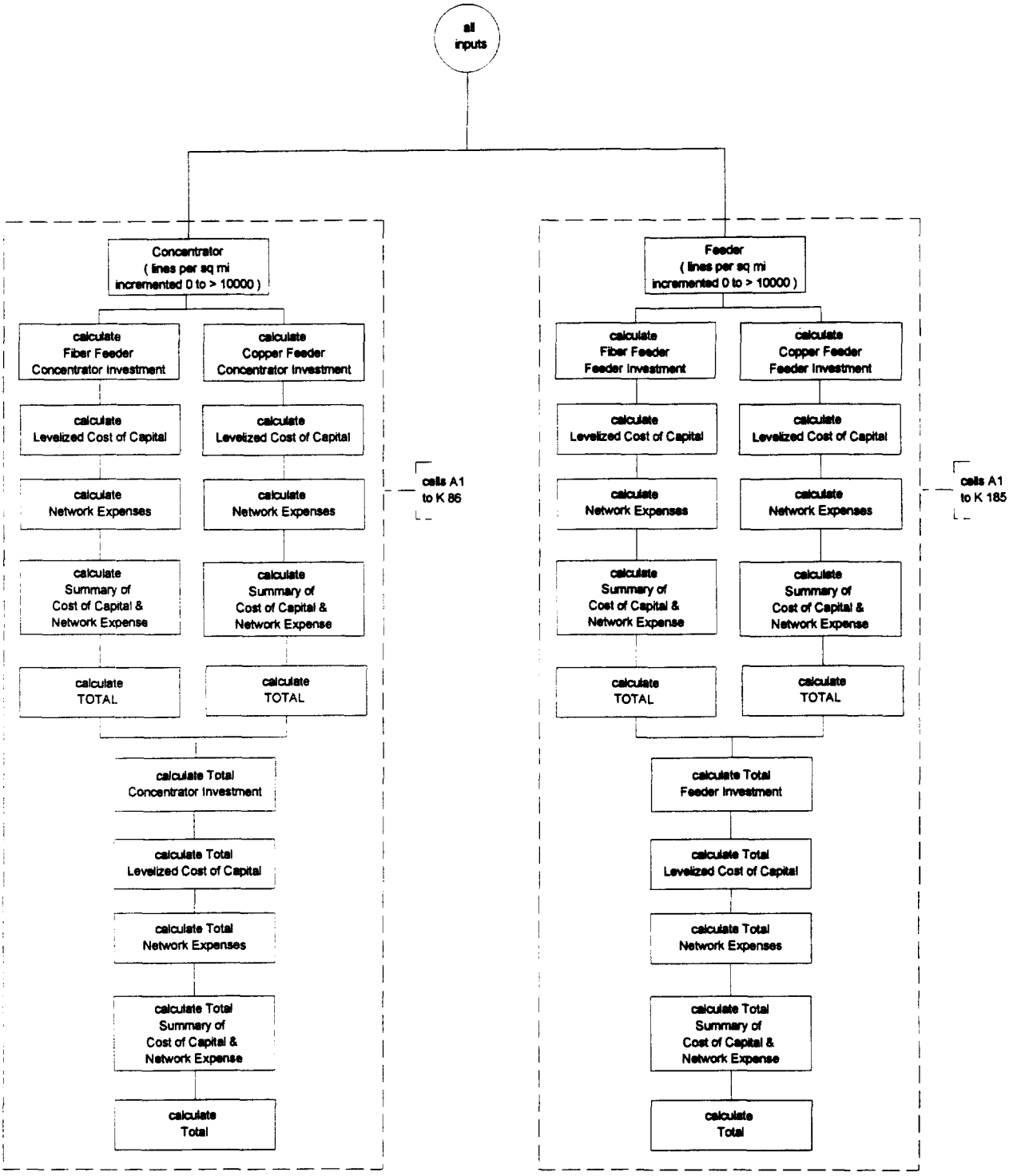
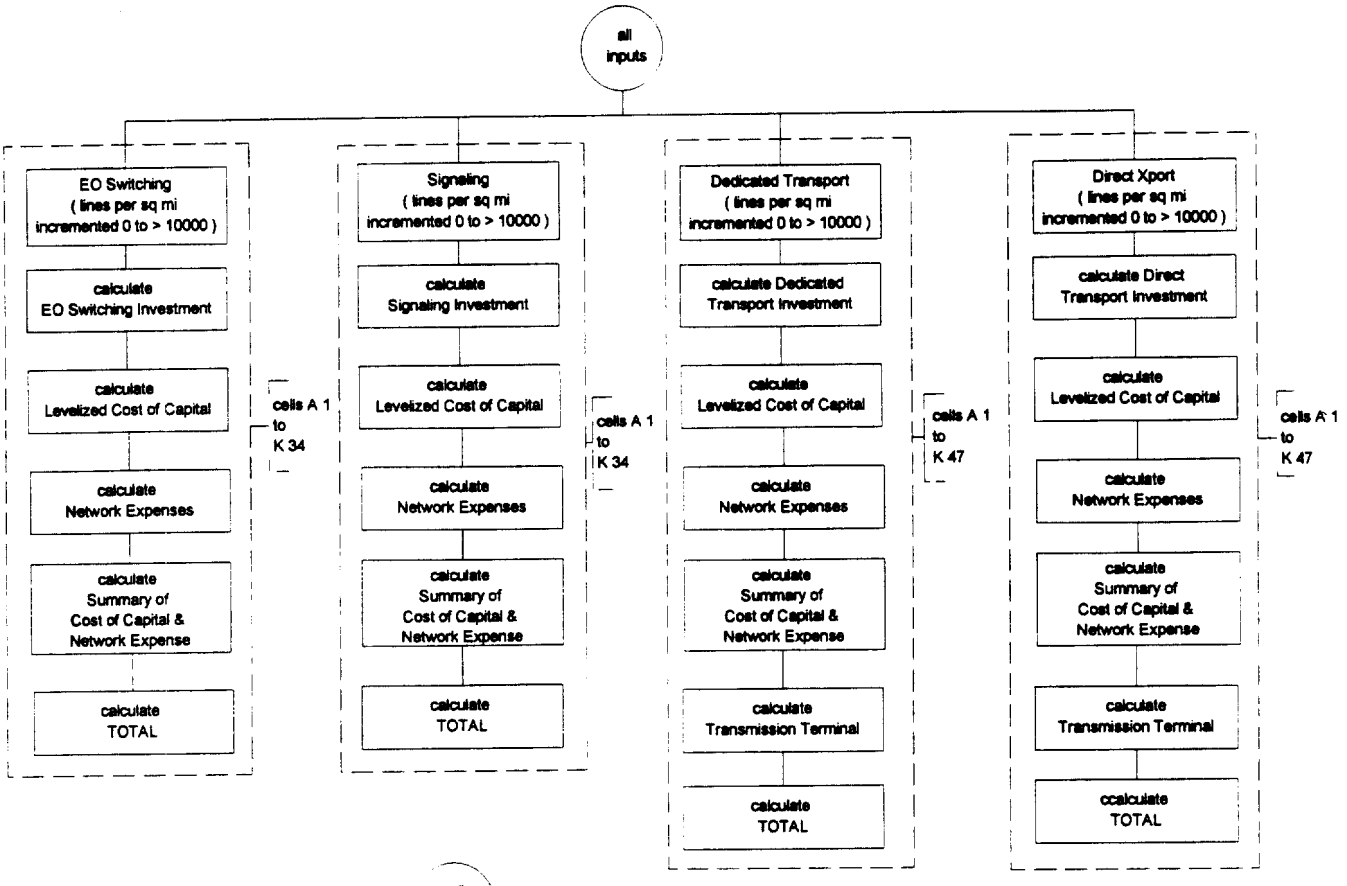
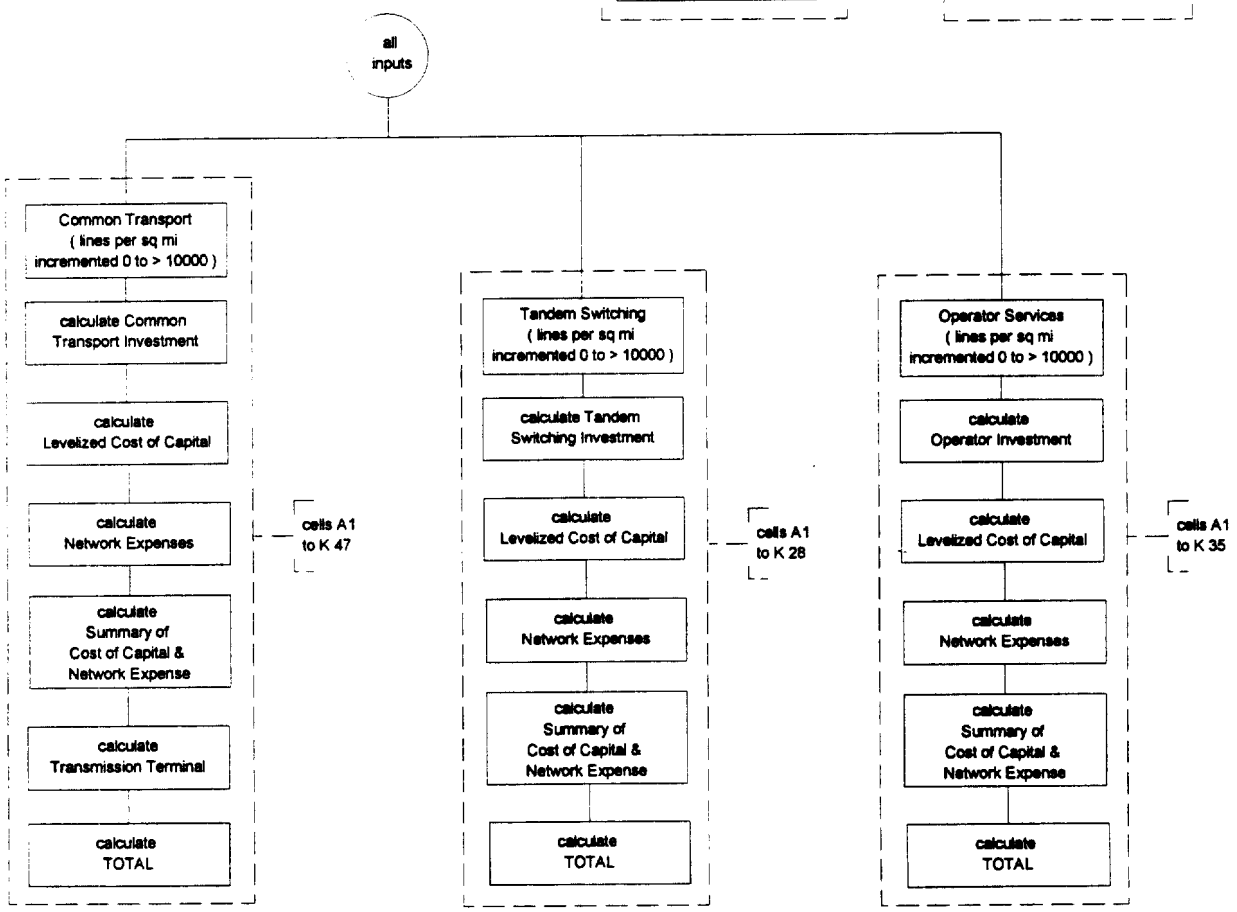

Scenario Inputs
ARMIS Inputs
CCCFactor
Cost detail
calculate Local interconnection
calculate IXC switched access
calculate Signaling detail
calculate Dedicated Transport Costs Per Trunk
calculate Trunk Port Costs
calculated distribution fill (DLC) lines per sq mi incremented 0 to > 10000 and weighted average
calculated distribution fill (non-DLC) lines per sq mi incremented 0 to > 10000 and weighted average
cells A 1 to K 57
Network-Related Expenses (lines per sq mi incremented 0 to > 10000) Expense by Service
calculate NI D Network Interface Device
calculate Distribution (DLC)
calculate Distribution (non-DLC)
calculate Distribution (all)
calculate Concentrator (DLC)
calculate Concentrator (non-DLC)
calculate Concentrator (all)
calculate Feeder (DLC)
calculate Feeder (non-DLC)
calculate Feeder (all)
calculate End Office Switching
calculate Signaling
calculate Dedicated Transport
calculate Dedicated Transport Transmission
calculate Direct Transport
calculate Direct Transport Transmission
calculate Common Transport
calculate Common Transport Transmission
calculate Tandem Switching
calculate Operator Systems
calculate Public Telephone
calculate Totals
calculate Total Network Costs
calculate Annual Cost Factors
cells A1 to L 249
Network Diagram populate network diagram with itemized cost of network plant


Investment Input
Inputs
COST SUMMARY of Network Element pertaining to: Annual Capital Cost, Network Expenses, Direct Expense and Support Expense
calculate NID Network interface Device
calculate Distribution (all)
calculate Concentrator (all)
calculate Feeder (all)
calculate End Office Switching
calculate Signaling
calculate Dedicated Transport
calculate Dedicated Transport Transmission
calculate Direct Transport
calculate Direct Transport Transmission
calculate Common Transport
calculate Common Transport Transmission
calculate Tandem Switching
calculate Operator Systems
calculate Public Telephone
calculate Total
cells A1 to J 39
General Support (lines per sq mi incremented 0 to > 10000)
calculate General Support Investment
calculate Levelized Cost of Capital
calculate TOTAL
cells A1 to K 26
Distribution (lines per sq mi incremented 0 to > 10000)
calculate Fiber Feeder Distribution Investment
calculate Copper Feeder Distribution Investment
calculate Levelized Cost of Capital
calculate Levelized Cost of Capital
calculate Network Expenses
calculate Network Expenses
calculate Summary of Cost of Capital & Network Expense
calculate Summary of Cost of Capital & Network Expense
calculate TOTAL
calculate TOTAL
calculate Total Distribution Investment
calculate Total Levelized Cost of Capital
calculate Total Network Expenses
calculate Total Summary of Cost of Capital & Network Expense
calculate Total NI D Cost
calculate Total Netw Exp using E:I
cells A1 to K 159

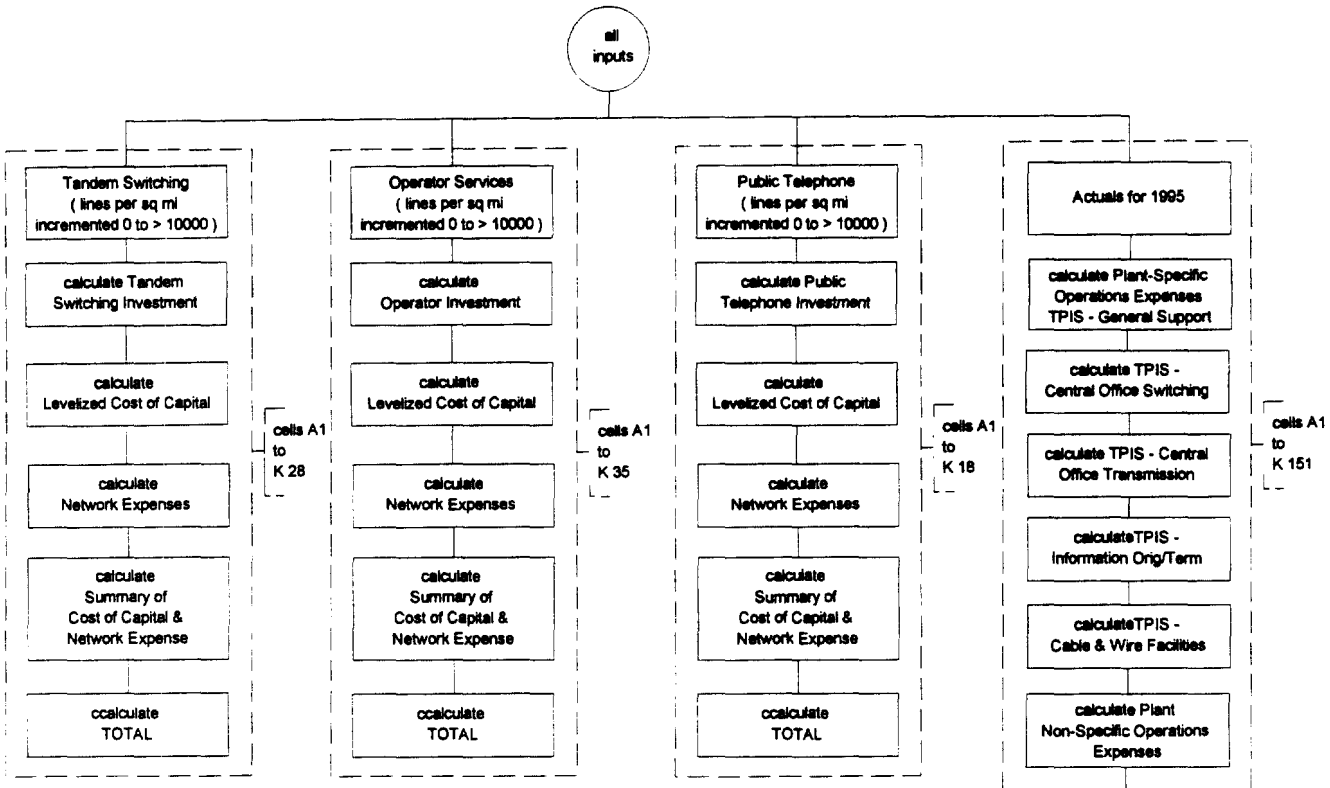
3

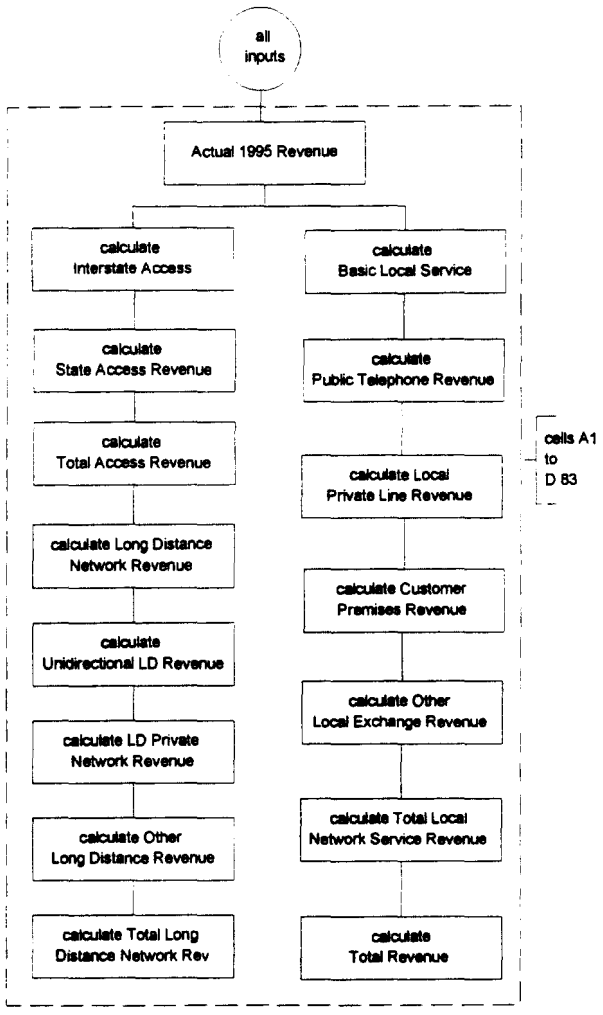

all inputs
Concentrator (lines per sq mi incremented 0 to > 10000)
calculate Fiber Feeder Concentrator Investment
calculate Copper Feeder Concentrator Investment
calculate Levelized Cost of Capital
calculate Levelized Cost of Capital
calculate Network Expenses
calculate Network Expenses
calculate Summary of Cost of Capital & Network Expense
calculate Summary of Cost of Capital & Network Expense
calculate TOTAL
calculate TOTAL
calculate Total Concentrator Investment
calculate Total Levelized Cost of Capital
calculate Total Network Expenses
calculate Total Summary of Cost of Capital & Network Expense
calculate Total
cells A1 to K 86
Feeder (lines per sq mi incremented 0 to > 10000)
calculate Fiber Feeder Feeder Investment
calculate Copper Feeder Feeder Investment
calculate Levelized Cost of Capital
calculate Levelized Cost of Capital
calculate Network Expenses
calculate Network Expenses
calculate Summary of Cost of Capital & Network Expense
calculate Summary of Cost of Capital & Network Expense
calculate TOTAL
calculate TOTAL
calculate Total Feeder Investment
calculate Total Levelized Cost of Capital
calculate Total Network Expenses
calculate Total Summary of Cost of Capital & Network Expense
calculate Total
cells A1 to K 185


all inputs
EO Switching (lines per sq mi incremented 0 to > 10000)
calculate EO Switching Investment
calculate Levelized Cost of Capital
calculate Network Expenses
calculate Summary of Cost of Capital & Network Expense
calculate TOTAL
cells A 1 to K 34
Signaling (lines per sq mi incremented 0 to > 10000)
calculate Signaling Investment
calculate Levelized Cost of Capital
calculate Network Expenses
calculate Summary of Cost of Capital & Network Expense
calculate TOTAL
cells A 1 to K 34
Dedicated Transport (lines per sq mi incremented 0 to > 10000)
calculate Dedicated Transport Investment
calculate Levelized Cost of Capital
calculate Network Expenses
calculate Summary of Cost of Capital & Network Expense
calculate Transmission Terminal
calculate TOTAL
cells A 1 to K 47
Direct Xport (lines per sq mi incremented 0 to > 10000)
calculate Direct Transport Investment
calculate Levelized Cost of Capital
calculate Network Expenses
calculate Summary of Cost of Capital & Network Expense
calculate Transmission Terminal
ccalculate TOTAL
cells A 1 to K 47


all inputs
Common Transport (lines per sq mi incremented 0 to > 10000)
calculate Common Transport Investment
calculate Levelized Cost of Capital
calculate Network Expenses
calculate Summary of Cost of Capital & Network Expense
calculate Transmission Terminal
calculate TOTAL
cells A1 to K 47
Tandem Switching (lines per sq mi incremented 0 to > 10000)
calculate Tandem Switching Investment
calculate Levelized Cost of Capital
calculate Network Expenses
calculate Summary of Cost of Capital & Network Expense
calculate TOTAL
cells A1 to K 28
Operator Services (lines per sq mi incremented 0 to > 10000)
calculate Operator Investment
calculate Levelized Cost of Capital
calculate Network Expenses
calculate Summary of Cost of Capital & Network Expense
calculate TOTAL
cells A1 to K 35

5

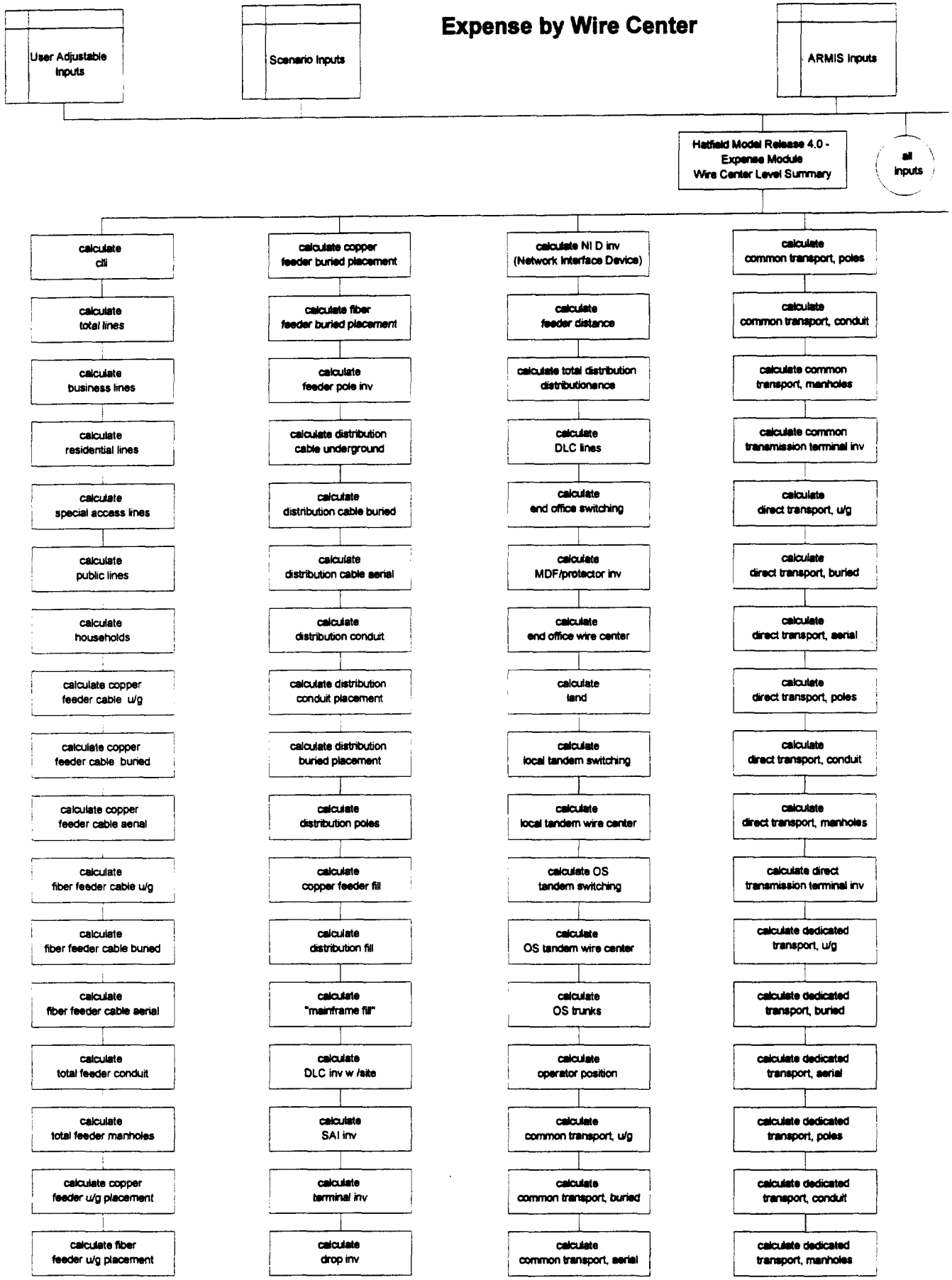

all inputs
Tandem Switching (lines per sq mi incremented 0 to > 10000)
calculate Tandem Switching Investment
calculate Levelized Cost of Capital
calculate Network Expenses
calculate Summary of Cost of Capital & Network Expense
ccalculate TOTAL
cells A1 to K 28
Operator Services (lines per sq mi incremented 0 to > 10000)
calculate Operator Investment
calculate Levelized Cost of Capital
calculate Network Expenses
calculate Summary of Cost of Capital & Network Expense
ccalculate TOTAL
cells A1 to K 35
Public Telephone (lines per sq mi incremented 0 to > 10000)
calculate Public Telephone Investment
calculate Levelized Cost of Capital
calculate Network Expenses
calculate Summary of Cost of Capital & Network Expense
ccalculate TOTAL
cells A1 to K 18
Actuals for 1995
calculate Plant-Specific Operations Expenses TPIS - General Support
calculate TPIS - Central Office Switching
calculate TPIS - Central Office Transmission
calculateTPIS - Information Orig/Term
calculateTPIS - Cable & Wire Facilities
calculate Plant Non-Specific Operations Expenses
calculate Network Support Factor Calculation
calculate Customer Operations Expenses
calculate Corporate Operations Expenses
calculate Total Corporate Operations Expense
calculate Total Operating Expenses note: does not include dep/amort
calculate Misc Expenses Calculation
calculate Other Taxes & Uncollectibles Calculation
cells A1 to K 151

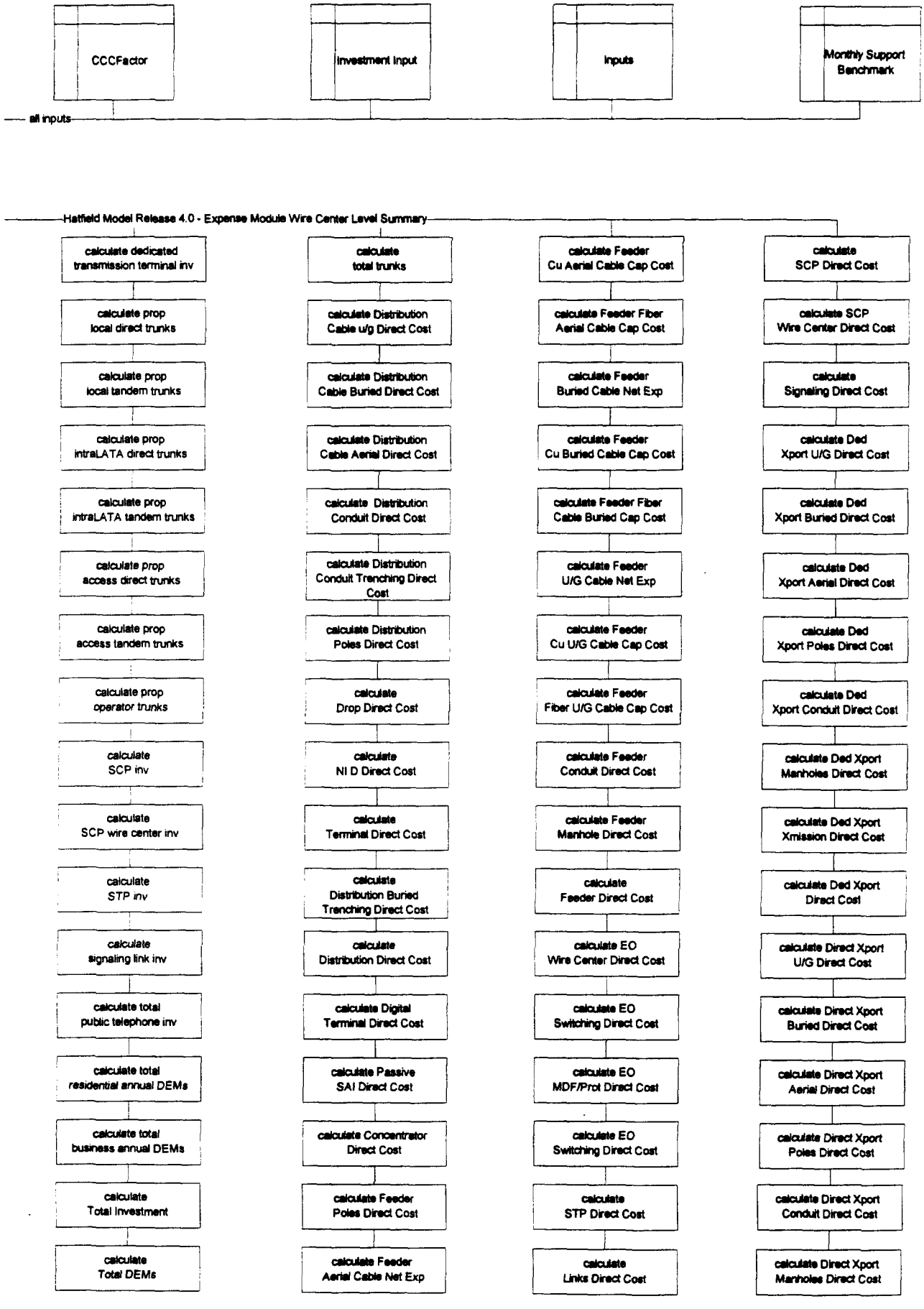

all inputs
Actual 1995 Revenue
calculate Interstate Access
calculate State Access Revenue
calculate Total Access Revenue
calculate Long Distance Network Revenue
calculate Unidirectional LD Revenue
calculate LD Private Network Revenue
calculate Other Long Distance Revenue
calculate Total Long Distance Network Rev
calculate Basic Local Service
calculate Public Telephone Revenue
calculate Local Private Line Revenue
calculate Customer Premises Revenue
calculate Other Local Exchange Revenue
calculate Total Local Network Service Revenue
calculate Total Revenue
cells A1 to D 83

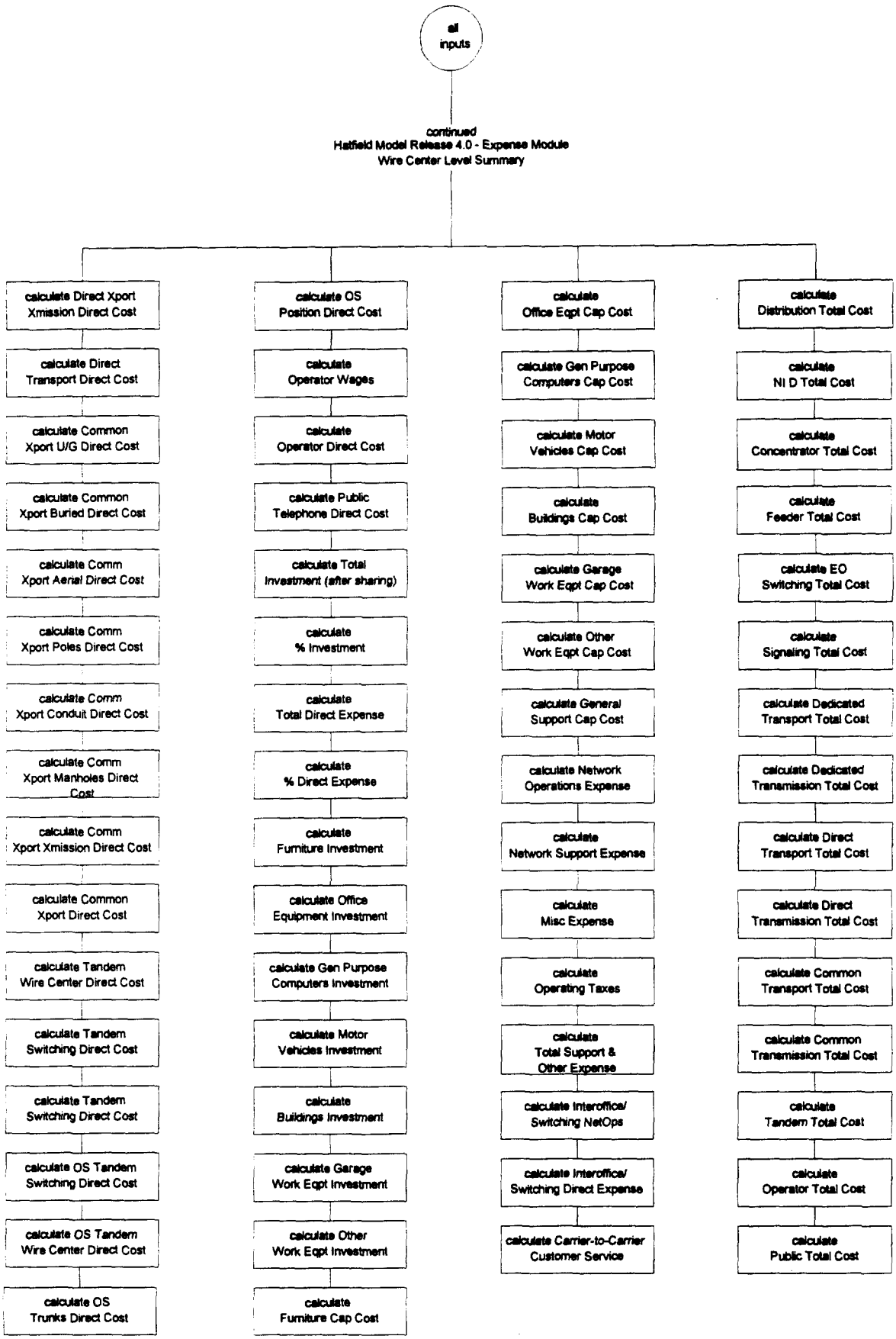
HM 4.0
Expense Wire Center
Module Flows

1	2
3	4

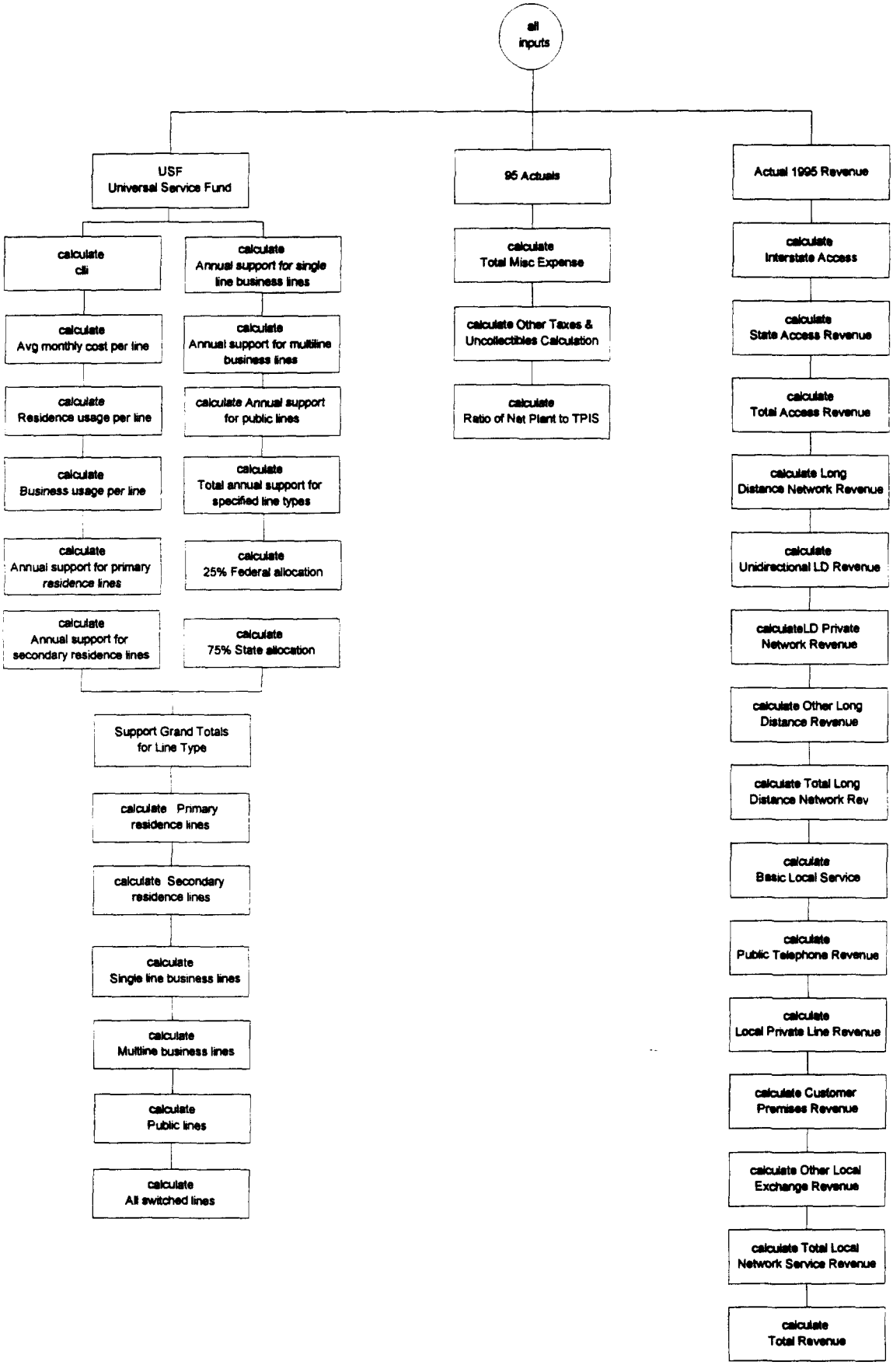
Expense by Wire Center




CCCFactor
Investment Input
Inputs
Monthly Support Benchmark
all inputs
Hatfield Model Release 4.0 - Expense Module Wire Center Level Summary
calculate dedicated transmission terminal inv
calculate prop local direct trunks
calculate prop local tandem trunks
calculate prop intraLATA direct trunks
calculate prop intraLATA tandem trunks
calculate prop access direct trunks
calculate prop access tandem trunks
calculate prop operator trunks
calculate SCP inv
calculate SCP wire center inv
calculate STP inv
calculate signaling link inv
calculate total public telephone inv
calculate total residential annual DEMs
calculate total business annual DEMs
calculate Total Investment
calculate Total DEMs
calculate total trunks
calculate Distribution Cable u/g Direct Cost
calculate Distribution Cable Buried Direct Cost
calculate Distribution Cable Aerial Direct Cost
calculate Distribution Conduit Direct Cost
calculate Distribution Conduit Trenching Direct Cost
calculate Distribution Poles Direct Cost
calculate Drop Direct Cost
calculate NI D Direct Cost
calculate Terminal Direct Cost
calculate Distribution Buried Trenching Direct Cost
calculate Distribution Direct Cost
calculate Digital Terminal Direct Cost
calculate Passive SAI Direct Cost
calculate Concentrator Direct Cost
calculate Feeder Poles Direct Cost
calculate Feeder Aerial Cable Net Exp
calculate Feeder Cu Aerial Cable Cap Cost
calculate Feeder Fiber Aerial Cable Cap Cost
calculate Feeder Buried Cable Net Exp
calculate Feeder Cu Buried Cable Cap Cost
calculate Feeder Fiber Cable Buried Cap Cost
calculate Feeder U/G Cable Net Exp
calculate Feeder Cu U/G Cable Cap Cost
calculate Feeder Fiber U/G Cable Cap Cost
calculate Feeder Conduit Direct Cost
calculate Feeder Manhole Direct Cost
calculate Feeder Direct Cost
calculate EO Wire Center Direct Cost
calculate EO Switching Direct Cost
calculate EO MDF/Prot Direct Cost
calculate EO Switching Direct Cost
calculate STP Direct Cost
calculate Links Direct Cost
calculate SCP Direct Cost
calculate SCP Wire Center Direct Cost
calculate Signaling Direct Cost
calculate Ded Xport U/G Direct Cost
calculate Ded Xport Buried Direct Cost
calculate Ded Xport Aerial Direct Cost
calculate Ded Xport Poles Direct Cost
calculate Ded Xport Conduit Direct Cost
calculate Ded Xport Manholes Direct Cost
calculate Ded Xport Xmission Direct Cost
calculate Ded Xport Direct Cost
calculate Direct Xport U/G Direct Cost
calculate Direct Xport Buried Direct Cost
calculate Direct Xport Aerial Direct Cost
calculate Direct Xport Poles Direct Cost
calculate Direct Xport Conduit Direct Cost
calculate Direct Xport Manholes Direct Cost


all inputs
continued
Hatfield Model Release 4.0 - Expense Module
Wire Center Level Summary
calculate Direct Xport Xmission Direct Cost
calculate Direct Transport Direct Cost
calculate Common Xport U/G Direct Cost
calculate Common Xport Buried Direct Cost
calculate Comm Xport Aerial Direct Cost
calculate Comm Xport Poles Direct Cost
calculate Comm Xport Conduit Direct Cost
calculate Comm Xport Manholes Direct Cost
calculate Comm Xport Xmission Direct Cost
calculate Common Xport Direct Cost
calculate Tandem Wire Center Direct Cost
calculate Tandem Switching Direct Cost
calculate Tandem Switching Direct Cost
calculate OS Tandem Switching Direct Cost
calculate OS Tandem Wire Center Direct Cost
calculate OS Trunks Direct Cost
calculate OS Position Direct Cost
calculate Operator Wages
calculate Operator Direct Cost
calculate Public Telephone Direct Cost
calculate Total Investment (after sharing)
calculate % Investment
calculate Total Direct Expense
calculate % Direct Expense
calculate Furniture Investment
calculate Office Equipment Investment
calculate Gen Purpose Computers Investment
calculate Motor Vehicles Investment
calculate Buildings Investment
calculate Garage Work Eqpt Investment
calculate Other Work Eqpt Investment
calculate Furniture Cap Cost
calculate Office Eqpt Cap Cost
calculate Gen Purpose Computers Cap Cost
calculate Motor Vehicles Cap Cost
calculate Buildings Cap Cost
calculate Garage Work Eqpt Cap Cost
calculate Other Work Eqpt Cap Cost
calculate General Support Cap Cost
calculate Network Operations Expense
calculate Network Support Expense
calculate Misc Expense
calculate Operating Taxes
calculate Total Support & Other Expense
calculate Interoffice/ Switching NetOps
calculate Interoffice/ Switching Direct Expense
calculate Carrier-to-Carrier Customer Service
calculate Distribution Total Cost
calculate NI D Total Cost
calculate Concentrator Total Cost
calculate Feeder Total Cost
calculate EO Switching Total Cost
calculate Signaling Total Cost
calculate Dedicated Transport Total Cost
calculate Dedicated Transmission Total Cost
calculate Direct Transport Total Cost
calculate Direct Transmission Total Cost
calculate Common Transport Total Cost
calculate Common Transmission Total Cost
calculate Tandem Total Cost
calculate Operator Total Cost
calculate Public Total Cost

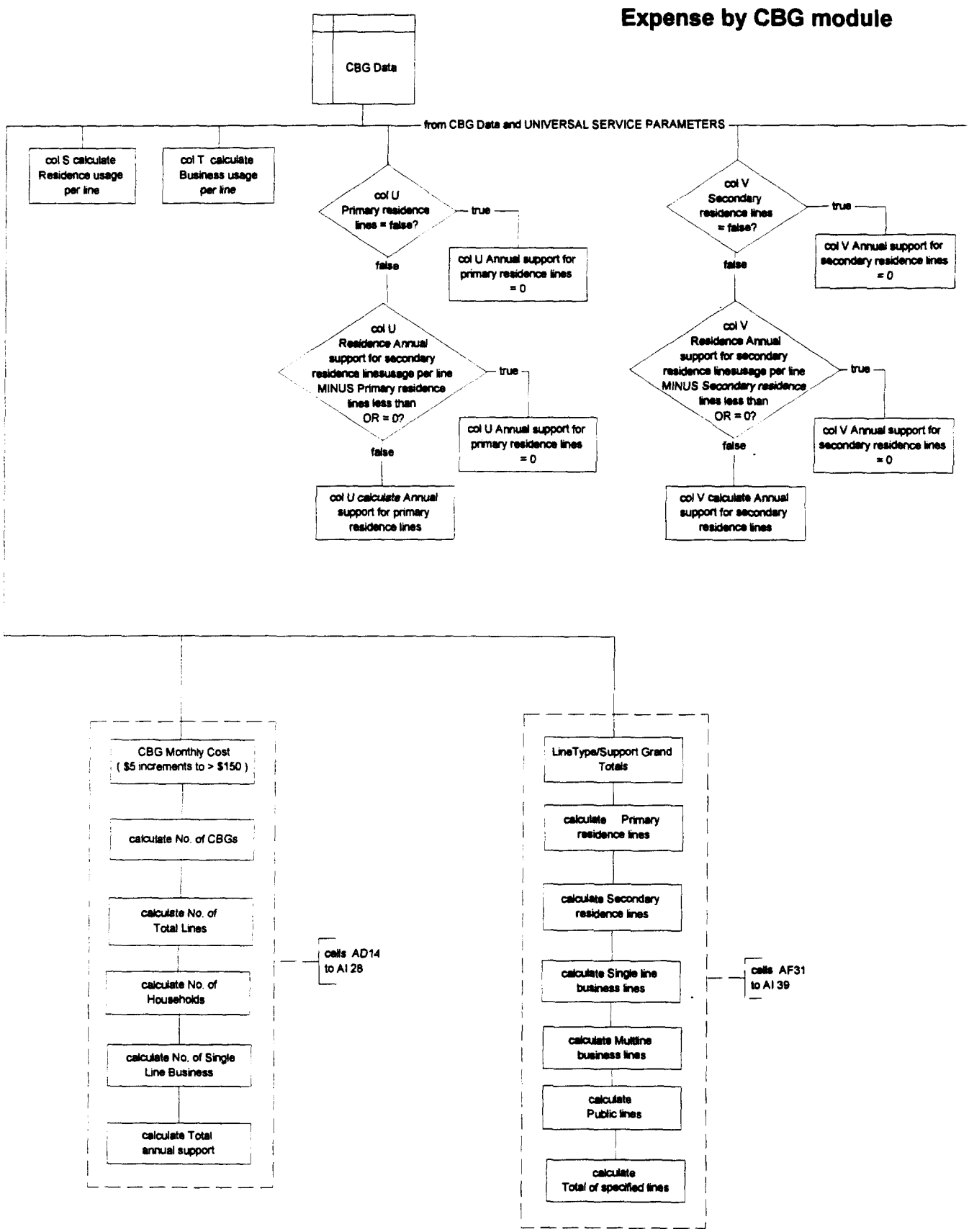
3


all inputs
USF Universal Service Fund
calculate cli
calculate Avg monthly cost per line
calculate Residence usage per line
calculate Business usage per line
calculate Annual support for primary residence lines
calculate Annual support for secondary residence lines
calculate Annual support for single line business lines
calculate Annual support for multiline business lines
calculate Annual support for public lines
calculate Total annual support for specified line types
calculate 25% Federal allocation
calculate 75% State allocation
Support Grand Totals for Line Type
calculate Primary residence lines
calculate Secondary residence lines
calculate Single line business lines
calculate Multiline business lines
calculate Public lines
calculate All switched lines
95 Actuals
calculate Total Misc Expense
calculate Other Taxes & Uncollectibles Calculation
calculate Ratio of Net Plant to TPIS
Actual 1995 Revenue
calculate Interstate Access
calculate State Access Revenue
calculate Total Access Revenue
calculate Long Distance Network Revenue
calculate Unidirectional LD Revenue
calculateLD Private Network Revenue
calculate Other Long Distance Revenue
calculate Total Long Distance Network Rev
calculate Basic Local Service
calculate Public Telephone Revenue
calculate Local Private Line Revenue
calculate Customer Premises Revenue
calculate Other Local Exchange Revenue
calculate Total Local Network Service Revenue
calculate Total Revenue

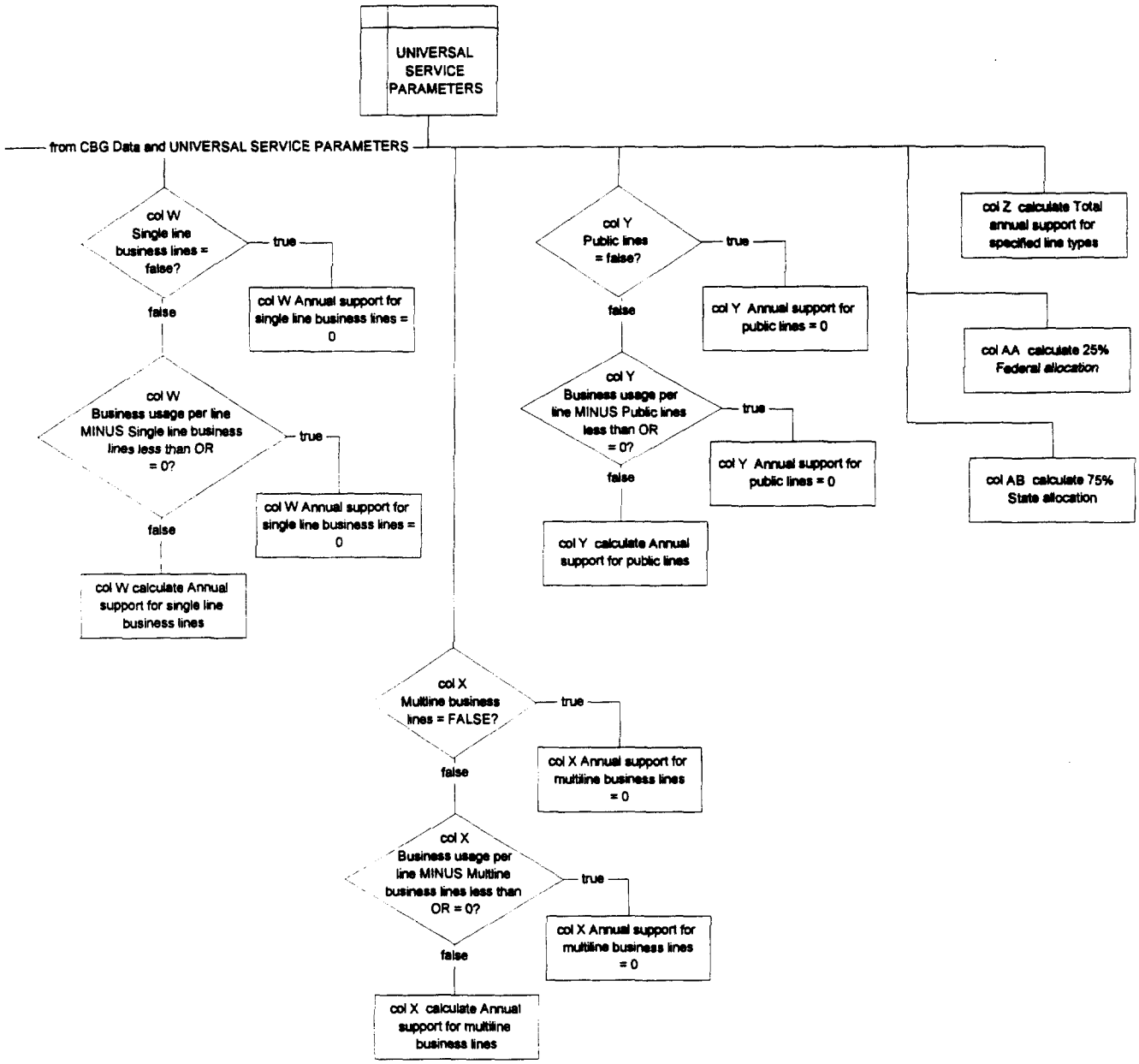
HM 4.0
Expense CBG
Module Flows

1	2

Expense by CBG module



1


UNIVERSAL SERVICE PARAMETERS
from CBG Data and UNIVERSAL SERVICE PARAMETERS
col W Single line business lines = false?
true
col W Annual support for single line business lines = 0
false
col W Business usage per line MINUS Single line business lines less than OR = 0?
true
col W Annual support for single line business lines = 0
false
col W calculate Annual support for single line business lines
col Y Public lines = false?
true
col Y Annual support for public lines = 0
false
col Y Business usage per line MINUS Public lines less than OR = 0?
true
col Y Annual support for public lines = 0
false
col Y calculate Annual support for public lines
col Z calculate Total annual support for specified line types
col AA calculate 25% Federal allocation
col AB calculate 75% State allocation
col X Multiline business lines = FALSE?
true
col X Annual support for multiline business lines = 0
false
col X Business usage per line MINUS Multiline business lines less than OR = 0?
true
col X Annual support for multiline business lines = 0
false
col X calculate Annual support for multiline business lines

Hatfield Model
Release 5.0

Inputs Portfolio

HAI Consulting, Inc.

737 29th Street, Suite 200
Boulder, Colorado 80303

December 11, 1997

Hatfield Model Release 5.0 Inputs Portfolio

Table of Contents

	Page	Tab
1. OVERVIEW	8	
2. DISTRIBUTION	9	1
2.1 Network Interface Device (NID)	9	1
2.2. DROP	13	2
2.2.1. Drop Distance	13	
2.2.2. Drop Placement, Aerial and Buried	13	
2.2.3. Buried Drop Sharing Fraction	15	
2.2.4. Aerial and Buried Drop Structure Fractions	16	
2.2.5. Average Lines per Business Location	16	
2.2.6. Aerial and Buried Terminal and Splice per Line	17	
2.2.7. Drop Cable Investment, per Foot and Pairs per Drop	17	
2.3 CABLE AND RISER INVESTMENT	19	3
2.3.1. Distribution Cable Sizes	19	
2.3.2. Distribution Cable, Cost per Foot	19	
2.3.3. Riser Cable Size and Cost per Foot	21	
2.4. POLES AND CONDUIT	22	4
2.4.1. Pole Investment	22	
2.4.2. Buried Copper Cable Sheath Multiplier (feeder and distribution)	23	
2.4.3. Conduit Material Investment per Foot	24	
2.4.4. Spare Tubes per Route	24	
2.4.5. Regional Labor Adjustment Factor	25	
2.5. BURIED, AERIAL, AND UNDERGROUND PLACEMENT FRACTION	35	5
2.6. CABLE SIZING FILL FACTORS AND POLE SPACING	39	6
2.6.1. Distribution Cable Sizing Fill Factors	39	
2.6.2. Distribution Pole Spacing	39	
2.7. GEOLOGY AND POPULATION CLUSTERS	41	7
2.7.1. Distribution Distance Multiplier, Difficult Terrain	41	
2.7.2. Rock Depth Threshold, Inches	41	
2.7.3. Hard Rock Placement Multiplier	41	
2.7.4. Soft Rock Placement Multiplier	42	
2.7.5. Sidewalk / Street Fraction	43	
2.7.6. Local RT (per Cluster) Thresholds – Maximum Total Distance	43	
2.7.7. Feeder Steering Enable	43	
2.7.8. Main Feeder Route/Air Multiplier	44	
2.8. LONG LOOP INVESTMENTS	45	8
2.8.1. T1 Repeater Investments, Installed	45	
2.8.2. CO Mux Capacity	46	

Table of Contents

	Page	Tab
2.8.3. Installed RT Cabinet and Commons	46	
2.8.4. T1 Channel Unit Investment per Subscriber	46	
2.8.5. Transceivers	47	
2.8.6. Remote Terminal Fill Factor	47	
2.8.7. Maximum T1s per Cable	47	
2.8.8. T1 Repeater Spacing Parameters	48	
2.9. SAI INVESTMENT	48	9
2.10. DEDICATED CIRCUIT INPUTS	51	10
2.10.1. Percentage of Dedicated Circuits	51	
2.10.2. Pairs per Dedicated Circuit	51	
2.10.3. Wireless Investment Cap Enable	51	
2.10.4. Wireless Point to Point Investment Cap – Distribution	52	
2.10.5. Wireless Common Investment	52	
2.10.6. Wireless per Line Investment	52	
2.10.7. Maximum Broadcast Lines per Common Investment	52	
3. FEEDER INPUT PARAMETERS	54	11
3.1. COPPER PLACEMENT	54	11
3.1.1. Copper Feeder Structure Fractions	54	
3.1.2. Copper Feeder Manhole Spacing, Feet	55	
3.1.3. Copper Feeder Pole Spacing, Feet	56	
3.1.4. Copper Feeder Pole Investment	57	
3.1.5. Innerduct Material Investment per Foot	58	
3.2. FIBER PLACEMENT	60	12
3.2.1. Fiber Feeder Structure Fractions	60	
3.2.2. Fiber Feeder Pullbox Spacing, Feet	61	
3.2.3. Buried Fiber Sheath Addition, per Foot	62	
3.3. CABLE SIZING FILL FACTORS	63	13
3.3.1. Copper Feeder Cable Sizing Fill Factors	63	
3.3.2. Fiber Feeder Cable Sizing Fill Factor	63	
3.4. CABLE COSTS	65	14
3.4.1. Copper Feeder Cable, Cost per Foot	65	
3.4.2. Fiber Feeder Cable, Cost per Foot	66	
3.4.3. Fiber Investment per Strand	67	
3.4.4. Copper Investment per Pair	68	
3.5. DLC EQUIPMENT	69	15
3.5.1. DLC Site and Power per Remote Terminal	69	
3.5.2. Maximum Line Size per Remote Terminal	69	
3.5.3. Remote Terminal Fill Factor	70	
3.5.4. DLC Initial Common Equipment Investment	70	
3.5.5. DLC Channel Unit Investment	70	
3.5.6. DLC Lines per Channel Unit	71	
3.5.7. Low Density DLC to GR-303 DLC Cutover	71	
3.5.8. Fiber Strands per Remote Terminal	71	

Table of Contents

	Page	Tab
3.5.9. Optical Patch Panel	72	
3.5.10. Copper Feeder Maximum Distance, Feet	72	
3.5.11. Common Equipment Investment per Additional Line Increment	73	
3.5.12. Maximum Number of Additional Line Modules per Remote Terminal	73	
3.6. MANHOLE INVESTMENT – COPPER FEEDER	75	16
3.6.1. Dewatering Factor for Manhole Placement	76	
3.6.2. Water Table Depth for Dewatering	76	
3.7. PULLBOX INVESTMENT – FIBER FEEDER	78	17
4. SWITCHING AND INTEROFFICE TRANSMISSION PARAMETERS	79	18
4.1. END OFFICE SWITCHING	79	18
4.1.1. Switch Real-Time Limit, BHCA	79	
4.1.2. Switch Traffic Limit, BHCCS	79	
4.1.3. Switch Maximum Equipped Line Size	80	
4.1.4. Switch Port Administrative Fill	80	
4.1.5. Switch Maximum Processor Occupancy	80	
4.1.6. MDF/Protector Investment per Line	81	
4.1.7. Analog Line Circuit Offset for DLC Lines, per Line	81	
4.1.8. Switch Installation Multiplier	81	
4.1.9. End Office Switching Investment Constant Term	82	
4.1.10. End Office Switching Investment Slope Term	82	
4.1.11. Processor Feature Loading Multiplier	83	
4.1.12. Business Penetration Ratio	83	
4.2. WIRE CENTER	84	19
4.2.1. Lot Size, Multiplier of Switch Room Size	84	
4.2.2. Tandem/EO Wire Center Common Factor	84	
4.2.3. Power Investment	84	
4.2.4. Switch Room Size	84	
4.2.5. Construction Costs, per Square Foot	85	
4.2.6. Land Price, per Square Foot	85	
4.3. TRAFFIC PARAMETERS	87	20
4.3.1. Local Call Attempts	87	
4.3.2. Call Completion Fraction	87	
4.3.3. IntraLATA Calls Completed	87	
4.3.4. InterLATA Intrastate Calls Completed	87	
4.3.5. InterLATA Interstate Calls Completed	87	
4.3.6. Local DEMs, Thousands	88	
4.3.7. Intrastate DEMs, Thousands	88	
4.3.8. Interstate DEMs, Thousands	88	
4.3.9. Local Business/Residential DEMs Ratio	88	
4.3.10. Intrastate Business/Residential DEMs	88	
4.3.11. Interstate Business/Residential DEMs	89	
4.3.12. Busy Hour Fraction of Daily Usage	89	
4.3.13. Annual to Daily Usage Reduction Factor	89	
4.3.14. Holding Time Multipliers, Residential/Business	90	
4.3.15. Call Attempts, Busy Hour (BHCA), Residential/Business	90	

Table of Contents

	Page	Tab
4.4. INTEROFFICE INVESTMENT	91	21
4.4.1. Transmission Terminal Investment	91	
4.4.2. Number of Fibers	91	
4.4.3. Pigtail Investment	91	
4.4.4 Optical Distribution Panel	92	
4.4.5. EF&I, per Hour	92	
4.4.6. EF&I, Units	92	
4.4.7. Regenerator Investment, Installed	93	
4.4.8. Regenerator Spacing, Miles	93	
4.4.9. Channel Bank Investment, per 24 Lines	93	
4.4.10. Fraction of SA Lines Requiring Multiplexing	94	
4.4.11. Digital Cross Connect System, Installed, per DS-3	94	
4.4.12. Transmission Terminal Fill (DS-0 level)	94	
4.4.13. Interoffice Fiber Cable Investment per Foot, Installed	94	
4.4.14. Number of Strands per ADM	95	
4.4.15. Interoffice Structure Percentages	96	
4.4.16. Transport Placement	96	
4.4.17. Buried Sheath Addition	96	
4.4.18. Interoffice Conduit, Cost and Number of Tubes	97	
4.4.19. Pullbox Spacing	98	
4.4.20. Pullbox Investment	98	
4.4.21. Pole Spacing, Interoffice	99	
4.4.22. Interoffice Pole Material and Labor	99	
4.4.23. Fraction of Interoffice Structure Common with Feeder	100	
4.4.24. Interoffice Structure Sharing Fraction	100	
4.5. TRANSMISSION PARAMETERS	102	22
4.5.1. Operator Traffic Fraction	102	
4.5.2. Total Interoffice Traffic Fraction	102	
4.5.3. Maximum Trunk Occupancy, CCS	102	
4.5.4. Trunk Port Investment, per End	102	
4.5.5. Direct-Routed Fraction of Local Interoffice Traffic	103	
4.5.6. Tandem-Routed Fraction of Total IntraLATA Toll Traffic	103	
4.5.7. Tandem-Routed Fraction of Total InterLATA Traffic	103	
4.5.8. POPs per Tandem Location	104	
4.5.9. Threshold Value for Off-Ring Wire Centers	104	
4.5.10. Remote-Host Fraction of Interoffice Traffic	104	
4.5.11. Host-Remote Fraction of Interoffice Traffic	105	
4.5.12. Maximum Nodes per Ring	105	
4.6. TANDEM SWITCHING	106	23
4.6.1. Real Time Limit, BHCA	106	
4.6.2. Port Limit, Trunks	106	
4.6.3. Tandem Common Equipment Investment	106	
4.6.4. Maximum Trunk Fill (Port Occupancy)	106	
4.6.5. Maximum Tandem Real Time Occupancy	107	
4.6.6. Tandem Common Equipment Intercept Factor	107	
4.6.7. Entrance Facility Distance from Serving Wire Center & IXC POP	107	
4.7. SIGNALING	109	24
4.7.1. STP Link Capacity	109	

Table of Contents

	Page	Tab
4.7.2. STP Maximum Fill	109	
4.7.3. STP Maximum Common Equipment Investment, per Pair	109	
4.7.4. STP Minimum Common Equipment Investment, per Pair	109	
4.7.5. Link Termination, Both Ends	110	
4.7.6. Signaling Link Bit Rate	110	
4.7.7. Link Occupancy	110	
4.7.8. C Link Cross-Section	111	
4.7.9. ISUP Messages per Interoffice BHCA	111	
4.7.10. ISUP Message Length, Bytes	111	
4.7.11. TCAP Messages per Transaction	112	
4.7.12. TCAP Message Length, Bytes	112	
4.7.13. Fraction of BHCA Requiring TCAP	112	
4.7.14. SCP Investment per Transaction per Second	113	
4.8. OS AND PUBLIC TELEPHONE	114	25
4.8.1. Investment per Operator Position	114	
4.8.2. Maximum Utilization per Position, CCS	114	
4.8.3. Operator Intervention Factor	114	
4.8.4. Public Telephone Equipment Investment per Station	114	
4.9. ICO PARAMETERS	116	26
4.9.1. ICO STP Investment, per Line	116	
4.9.2. ICO Local Tandem Investment, per Line	116	
4.9.3. ICO OS Tandem Investment, per Line	116	
4.9.4. ICO SCP Investment, per Line	116	
4.9.5. ICO Local Tandem Wire Center Investment, per Line	117	
4.9.6. ICO OS Tandem Wire Center Investment, per Line	117	
4.9.7. ICO STP/SCP Wire Center Investment, per Line	117	
4.9.8. ICO C-Link / Tandem A-Link Investment, per Line	118	
4.10. HOST – REMOTE PARAMETERS	118	27
4.10.1. Host – Remote CLLI Assignments	118	
4.10.2. Host – Remote Assignment Enable	118	
5. EXPENSE	119	28
5.1. COST OF CAPITAL AND CAPITAL STRUCTURE	119	28
5.2. DEPRECIATION AND NET SALVAGE	120	28
5.3. STRUCTURE SHARING FRACTION	121	28
5.4. OTHER EXPENSE INPUTS	122	28
5.4.1. Income Tax Rate	122	
5.4.2. Corporate Overhead Factor	122	
5.4.3. Other Taxes Factor	122	
5.4.4. Billing/Bill Inquiry per Line per Month	122	
5.4.5. Directory Listing per Line per Month	123	
5.4.6. Forward-Looking Network Operations Factor	123	
5.4.7. Alternative Central Office Switching Expense Factor	124	
5.4.8. Alternative Circuit Equipment Factor	124	

Table of Contents

	Page	Tab
5.4.9. End Office Non Line-Port Cost Fraction	124	
5.4.10. Monthly LNP Cost, per Line	125	
5.4.11. Carrier-Carrier Customer Service, per Line, per Year	125	
5.4.12. NID Expense, per Line, per Year	125	
5.4.13. DS-0/DS-1 Terminal Factor	126	
5.4.14. DS-1/DS-3 Terminal Factor	126	
5.4.15. Average Lines per Business Location	126	
5.4.16. Average Trunk Utilization	127	
6. EXCAVATION AND RESTORATION	128	29
6.1. UNDERGROUND EXCAVATION	128	
6.2. UNDERGROUND RESTORATION	128	
6.3. BURIED EXCAVATION	132	
6.4. BURIED INSTALLATION AND RESTORATION	132	
6.5. SURFACE TEXTURE MULTIPLIER	136	
APPENDIX A	142	30
Interoffice Transmission Terminal Configuration (OC-48 Fiber Ring)	142	
APPENDIX B	143	30
Structure Shares Assigned to Incumbent Local Telephone Companies	143	
B.1. Overview	143	
B.2. Structure Sharing Parameters	144	
B.3. Support	145	
References	149	
APPENDIX C	150	30
Expenses in Hatfield Model 5.0	150	
APPENDIX D	153	30
Network Operations Reduction	153	
index:	155	31

1. OVERVIEW

This draft document contains descriptions of the user-adjustable inputs to the Hatfield Model, version 5.0 ("HM5.0"), the default values assigned to the inputs, and the rationales and supporting evidence for these default values. The inputs and assumptions in HM5.0 are based on information in publicly available documents, expert engineering judgment, or price quotes from suppliers and contractors.

Prices of telecommunications equipment and materials are notoriously difficult to obtain from manufacturers and large sales organizations. Although salespeople will occasionally provide "ballpark" prices, they will do so only informally and with the caveat that they may not be quoted and the company's identity must be concealed. It is very nearly impossible to obtain written, and hence "citable," price quotations, even for "list" prices, from vendors of equipment, cable and wire, and other items that are used in the telecommunications infrastructure. Part of the reason for this is that the vendors have long-standing relationships with the principal users of such equipment, the incumbent local exchange carriers ("ILECs"), and they apparently believe that public disclosure of any prices, list or discounted, might jeopardize these relationships. Further, they may fear retaliation by the ILECs if they were to provide pricing explicitly for use in cost models such as HM5.0.[1] The HM5.0 developers thus have often been forced to rely on informal discussions with vendor representatives and personal experience in purchasing or recommending such equipment and materials. Nevertheless, a great deal of experience and expertise in the industry underlies the estimates, where they were necessary to augment explicit, publicly-available information.

This document contains a number of graphs that illustrate a range of prices for particular kinds of telecommunications equipment. The information contained in these graphs was gathered to validate the opinions of outside plant experts who used their collective industry knowledge and experience to estimate the costs of particular items.

This document will continue to evolve as more documented sources are found to support the input values and assumptions.

Organization of Material:
Material is generally organized in this binder in the same order as default values appear in Model Input screens in the Hatfield Model.

[1] See, for example, "U S West to Suppliers: Back Us or Lose Business," *Inter@ctive Week*, September 16, 1996.

2. DISTRIBUTION

2.1 Network Interface Device (NID)

Definition: The investment in the components of the network interface device (NID), the device at the customers' premises within which the drop wire terminates, and which is the point of subscriber demarcation. The NID investment is calculated as the cost of the NID case plus the product of the protection block cost per line and the number of lines terminated.

Default Values:

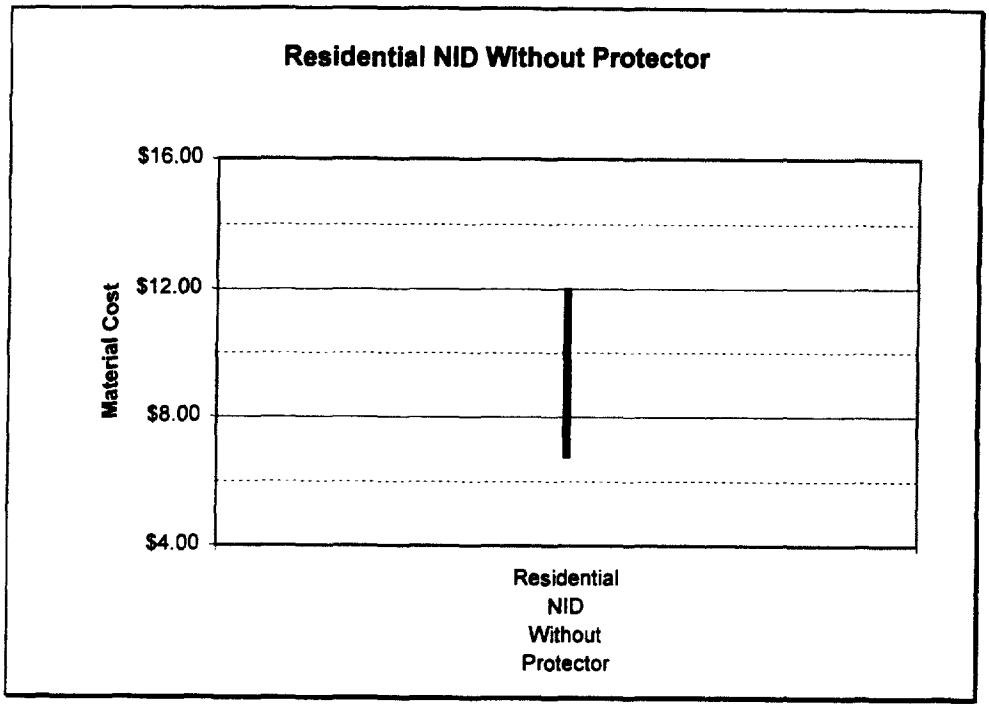
NID Materials and Installation	
	Cost
Residential NID case, no protector	$10.00
Residential NID basic labor	$15.00
Installed NID case	*$25.00*
Maximum lines per res. NID	6
Protection block, per line	$4.00
Business NID case, no protector	$25.00
Business NID basic labor	$15.00
Installed NID case	*$40.00*
Protection block, per line	$4.00
Indoor NID Case	$5.00

Support:

a) Residential NID Cost without Protector

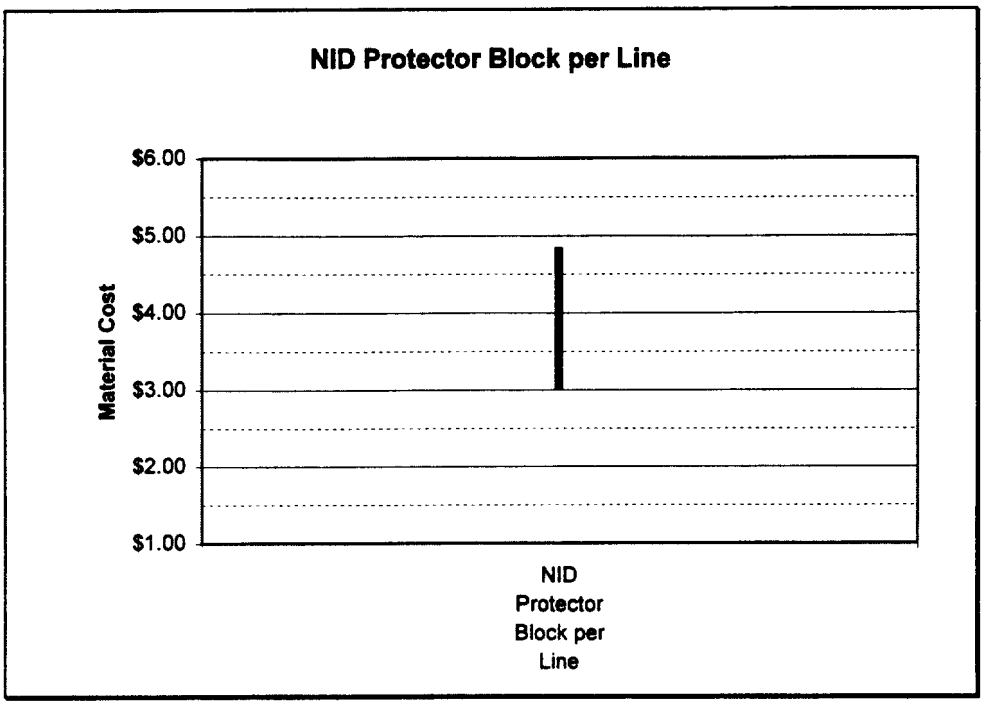
The labor estimate assumes a crew installing network interface devices throughout a neighborhood or CBG (in coordination with the installation of drops, terminals, and distribution cables). A work time of 25 minutes was used, based on the opinion of a team of outside plant experts. A loaded labor rate of $35 per hour excludes exempt material loadings which normally include the material cost of the NID and Drops. A residential NID shell has capacity for two protectors.

Price quotes for material were received from several sources. Results were as follows:


Residential NID Without Protector
$16.00
$12.00
$8.00
$4.00
Material Cost
Residential
NID
Without
Protector

b) NID Protection Block per Line

Price quotes for material were received from several sources. Results were as follows:



c) Business NID - No Protector

The labor estimate assumes a crew installing network interface devices throughout a neighborhood or CBG (in coordination with the installation of drops, terminals, and distribution cables). A work time of 25 minutes was used, based on the opinion of a team of outside plant experts. A loaded labor rate of $35 per hour excludes exempt material loadings which normally include the material cost of the NID and Drops. A business NID shell has capacity for six protectors.