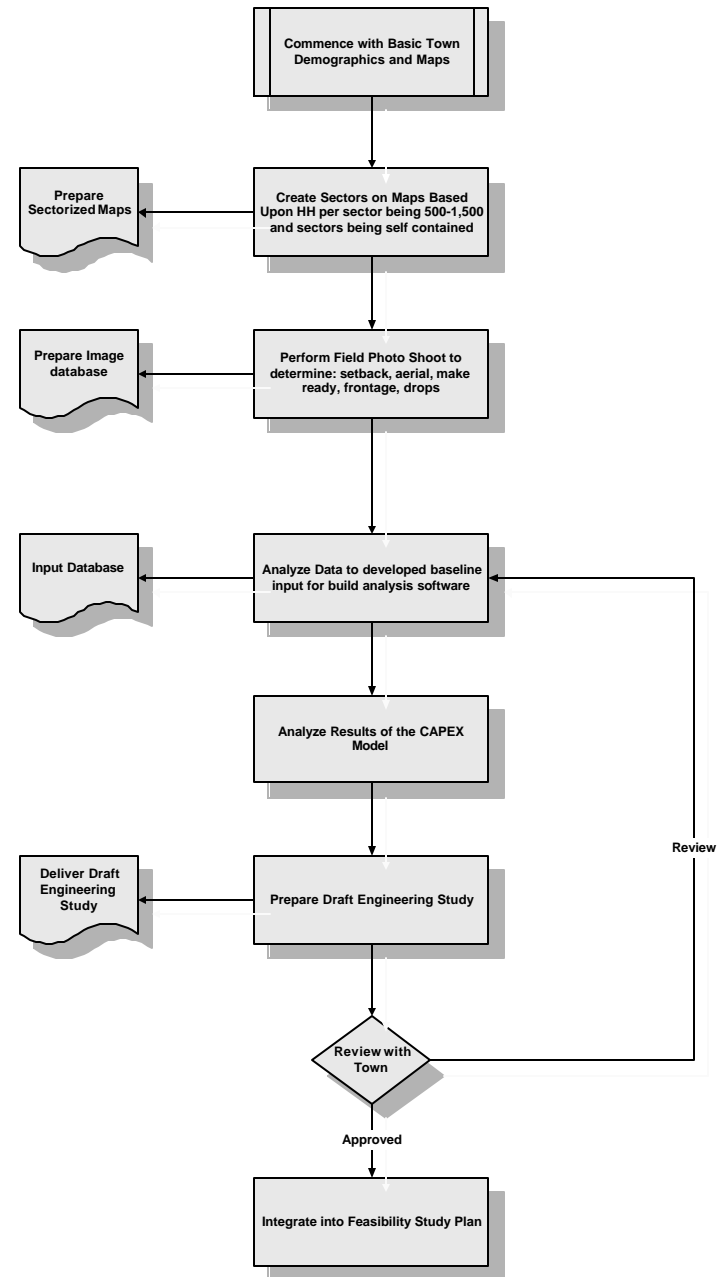


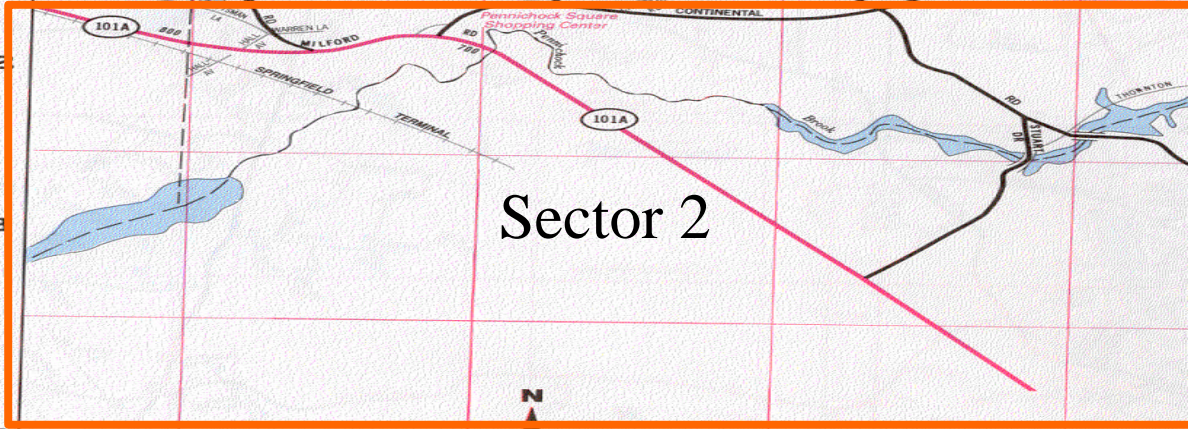
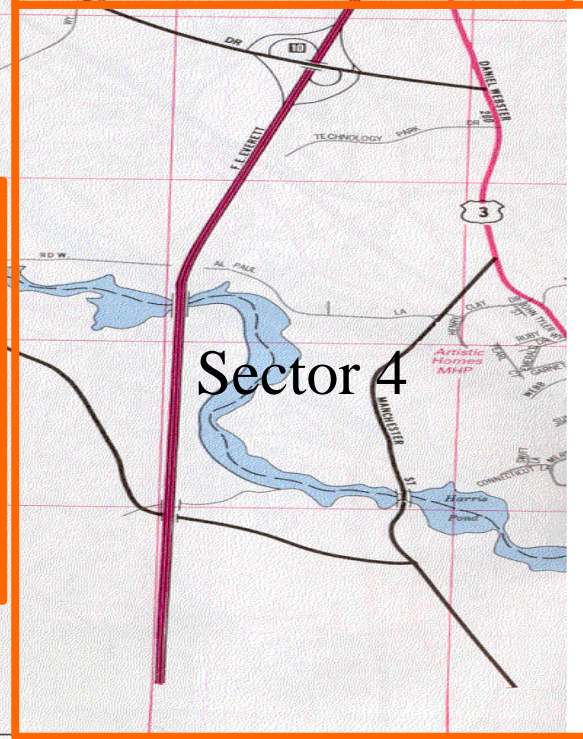
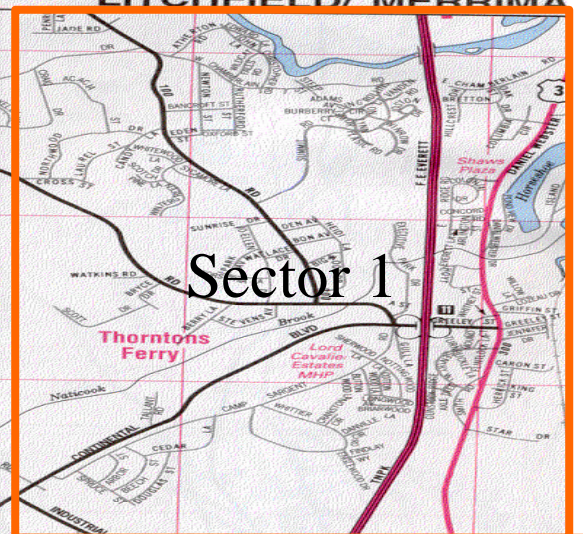
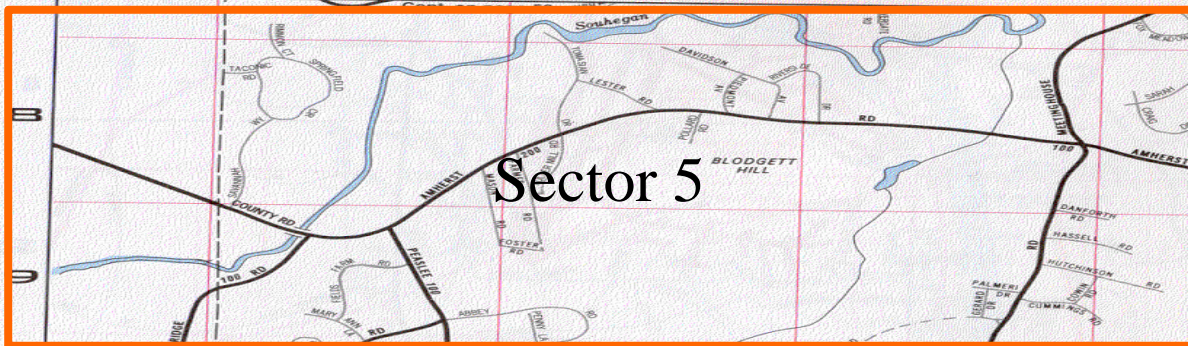
THE MERTON GROUP

Municipal Broadband Networks Infrastructure Merrimack, NH

Methodology

Engineering Methodology

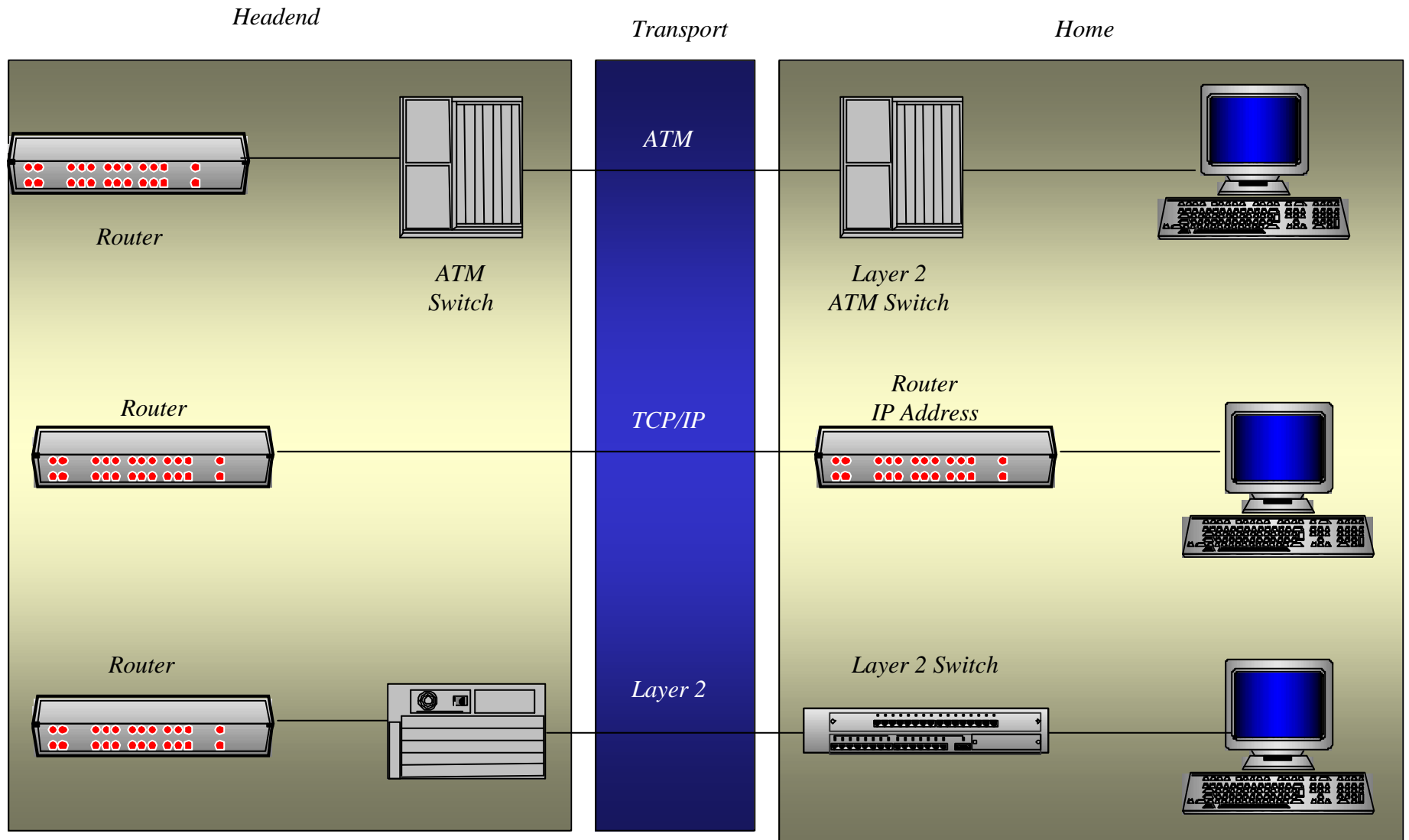




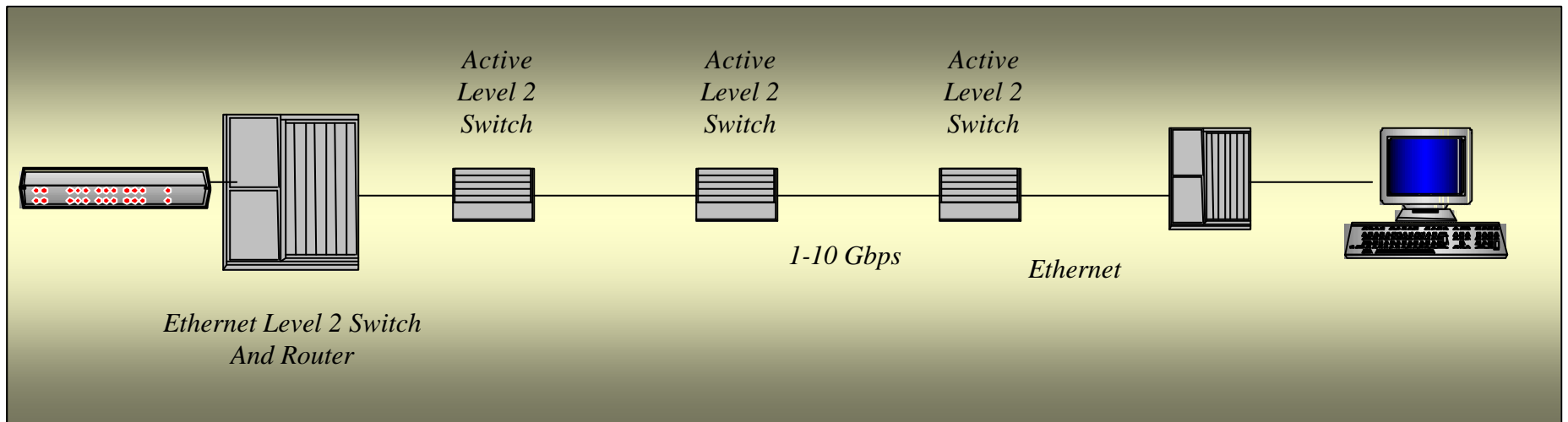
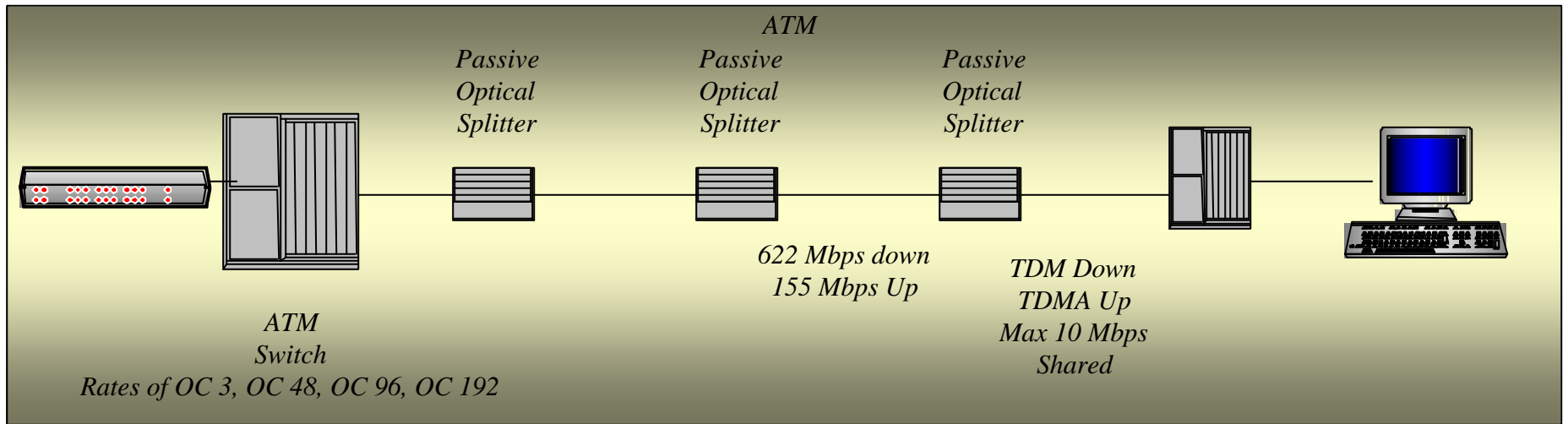


General Architecture

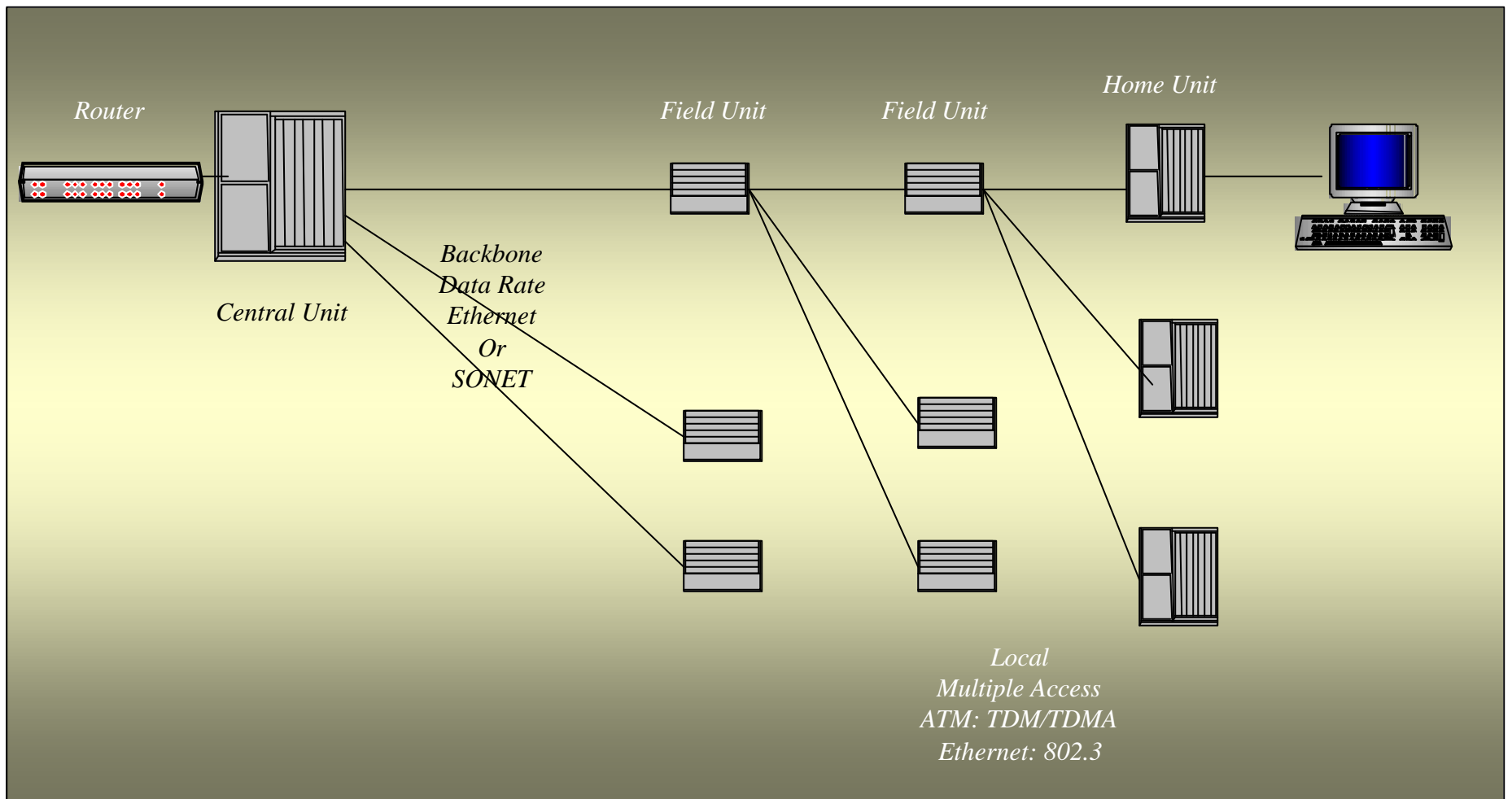
Ethernet Layer 2, 3 and ATM



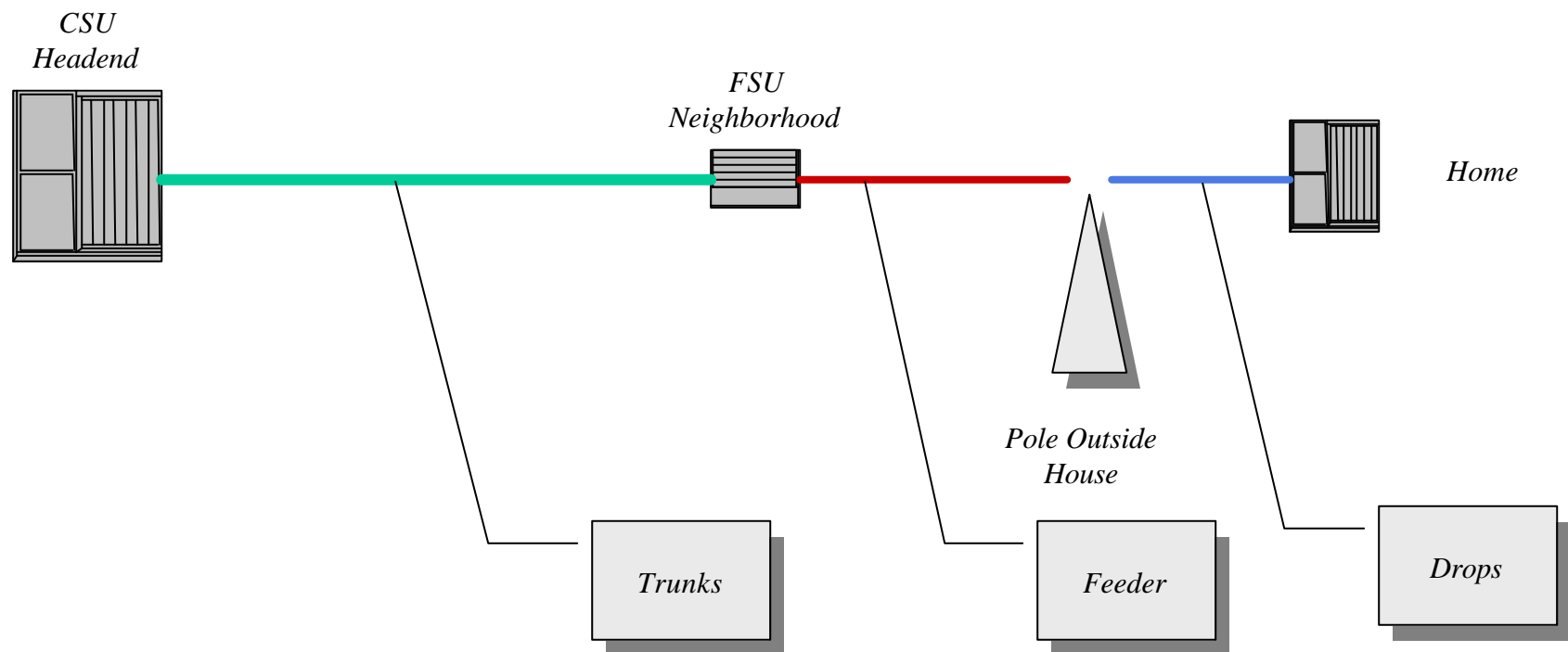
Fiber Rates ATM v GigE



Basic Architecture



Generic Fiber Network Elements



Local Architecture

Merrimack Frontage

Sector	Street Miles	Average Frontage	Weighted Average Frontage
1	19	236	59
2	23	506	127
3	29	282	71
4	8	200	10
5	25	239	48

Total Average
Frontage

314

Merrimack, NH Set Back

Sector	Street Miles	Average Set Back	Weighted Average Setback
1	19	214	54
2	23	334	84
3	29	221	55
4	8	200	10
5	25	232	46

105

Total Average Set
Back

249

Merrimack, NH Make Ready

Sector	Street Miles	Average Make Ready	Weighted Make Ready
1	19	14%	4%
2	23	0%	0%
3	29	39%	10%
4	8	0%	0%
5	25	60%	12%

Total Average
Make Ready

25%

Merrimack Aerial

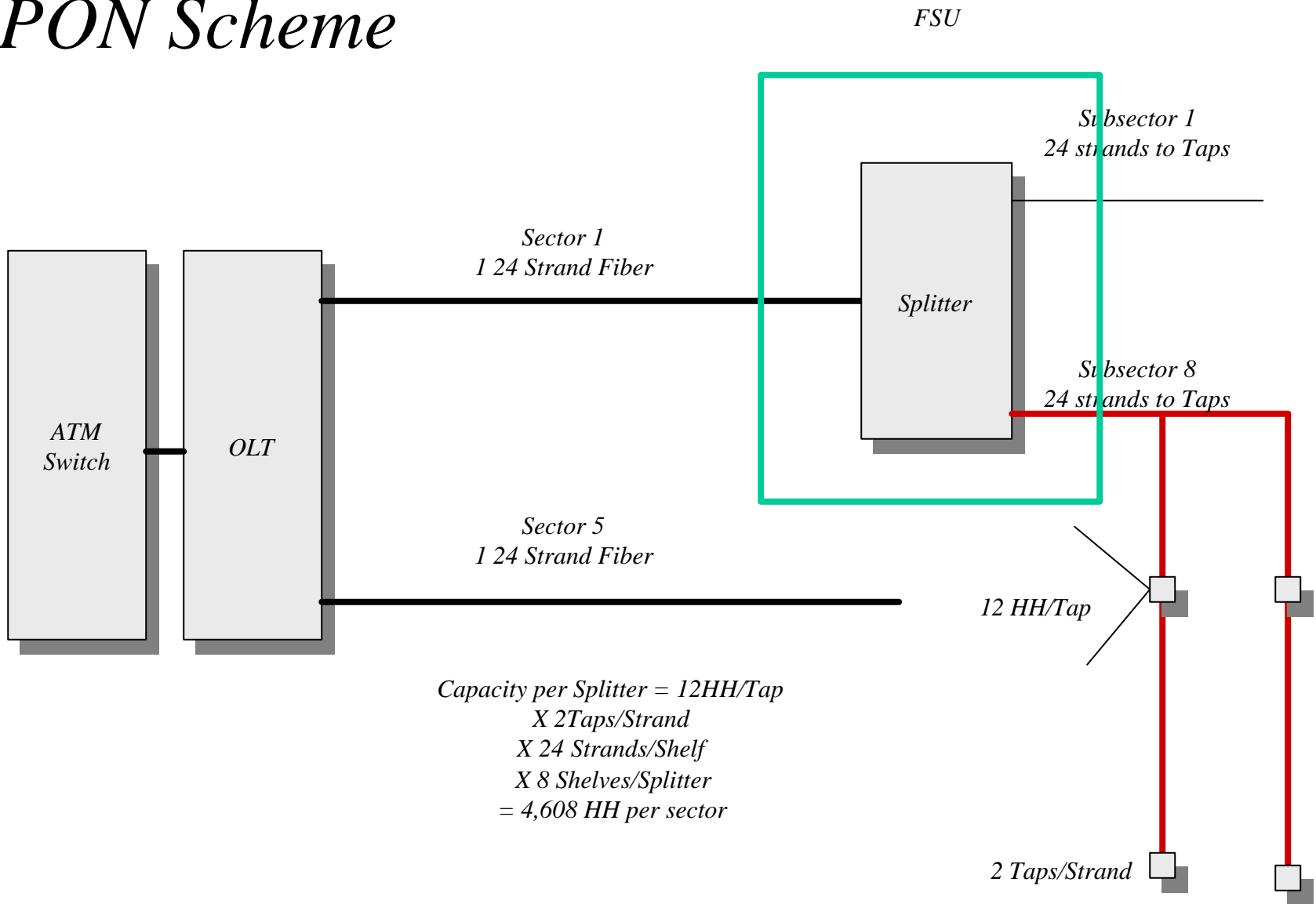
Sector	Street Miles	Average Aerial	Weighted Average Aerial
1	19	57%	14%
2	23	44%	11%
3	29	68%	17%
4	8	100%	5%
5	25	95%	19%

Total Average
Aerial

66%

PON Architecture

PON Scheme

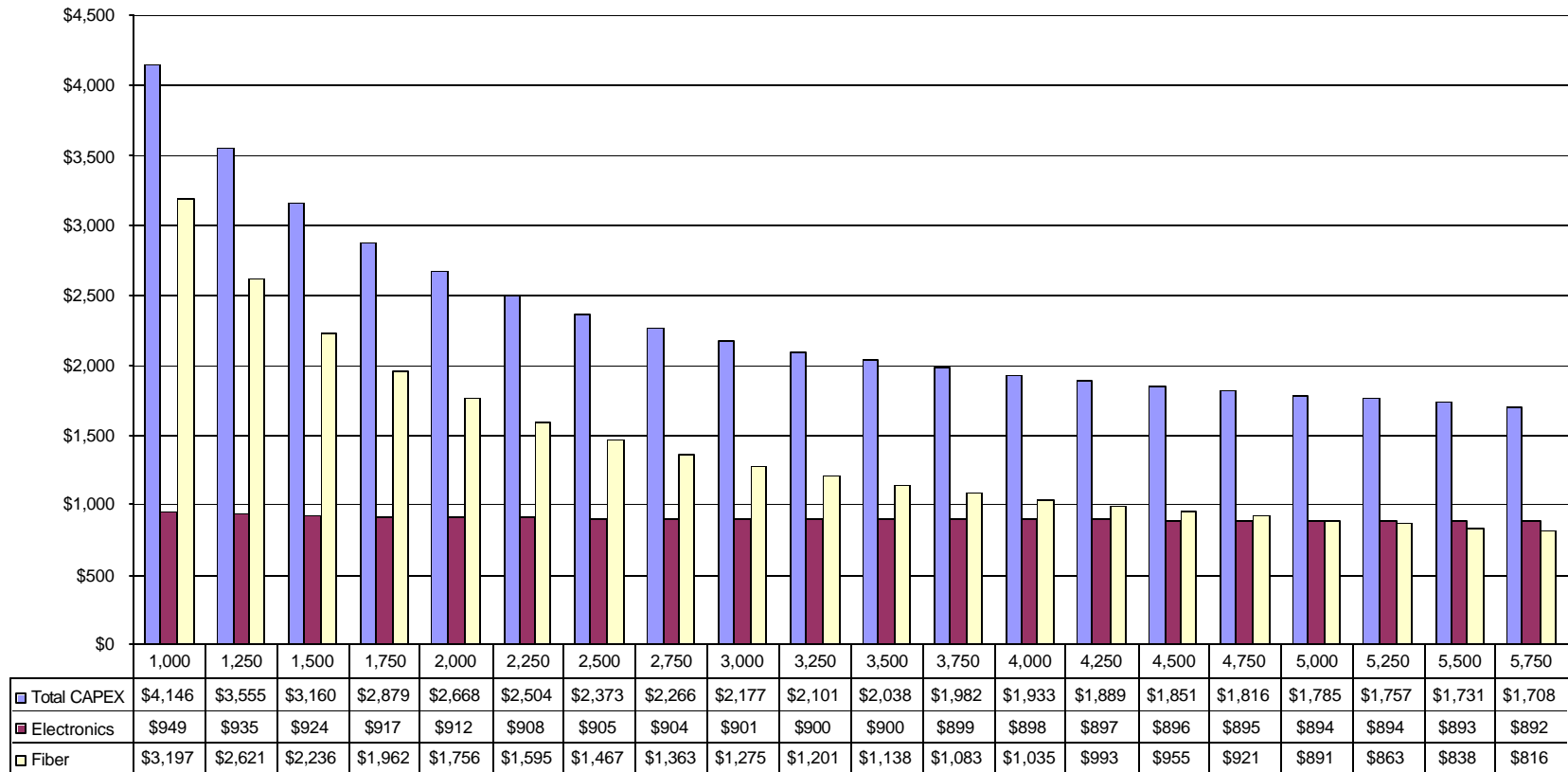


PON Cost Analysis

<i>Unit</i>	<i>Fixed</i>	<i>Variable</i>	<i>Capacity</i>	<i>Example for 1,000 HH</i>	<i>Per HH CAPEX</i>
EUU, End User Unit		\$1,067	1 per user	\$1,067,000	\$1,067
Taps		\$558	12 users per Tap	\$46,500	\$47
Splitter	\$7,000	\$1,380	8 splitter draws pre cabinet, 576 HH per splitter draw, maximum of 4,608 HH per Splitter cabinet. Typically 5 sectors so 5 splitters	\$41,900	\$42
ATM Switch	\$40,000	\$4,000	Max capacity 15 OC-3 Cards, incremental cost per OC-3 Card, user has 2 Mbps at 5% utilization is 100 Kbps per user.	\$44,000	\$44
OLT PON Card		\$6,000	Maximum 18 Cards per shelf, capacity of 64 users per card	\$93,750	\$94
OLT Rack		\$10,000	Maximum of 3 Shelves per rack. 3,456 HH per Rack	\$10,000	\$10
Number HH				1,000	
Total				\$1,303,150	
Total per HH				\$1,303	\$1,303
Total Fiber Miles		\$25,000	In town of 80 miles with 70% coverage	\$1,400,000	\$1,400
Drop Cost		\$300		300,000	\$300
Total per HH with Fiber					\$3,003

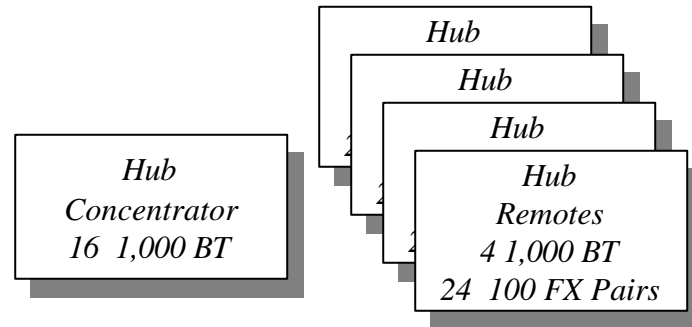
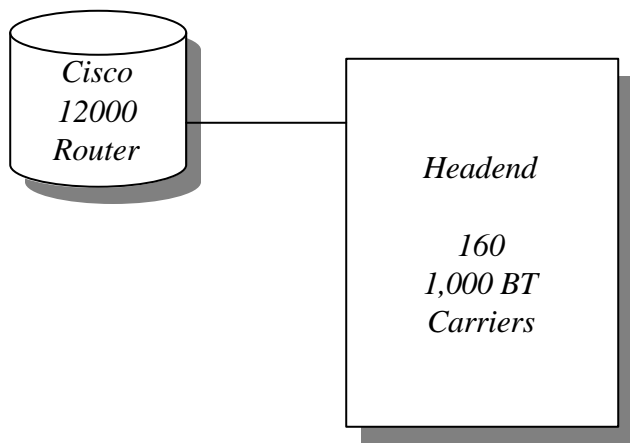
CAPEX PON

CAPEX per HH vs Number HH (PON)

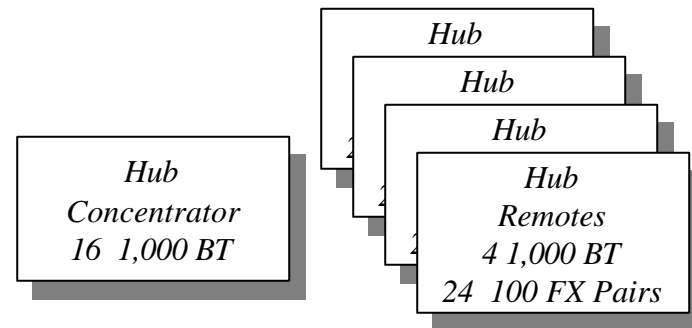


GigE Architecture

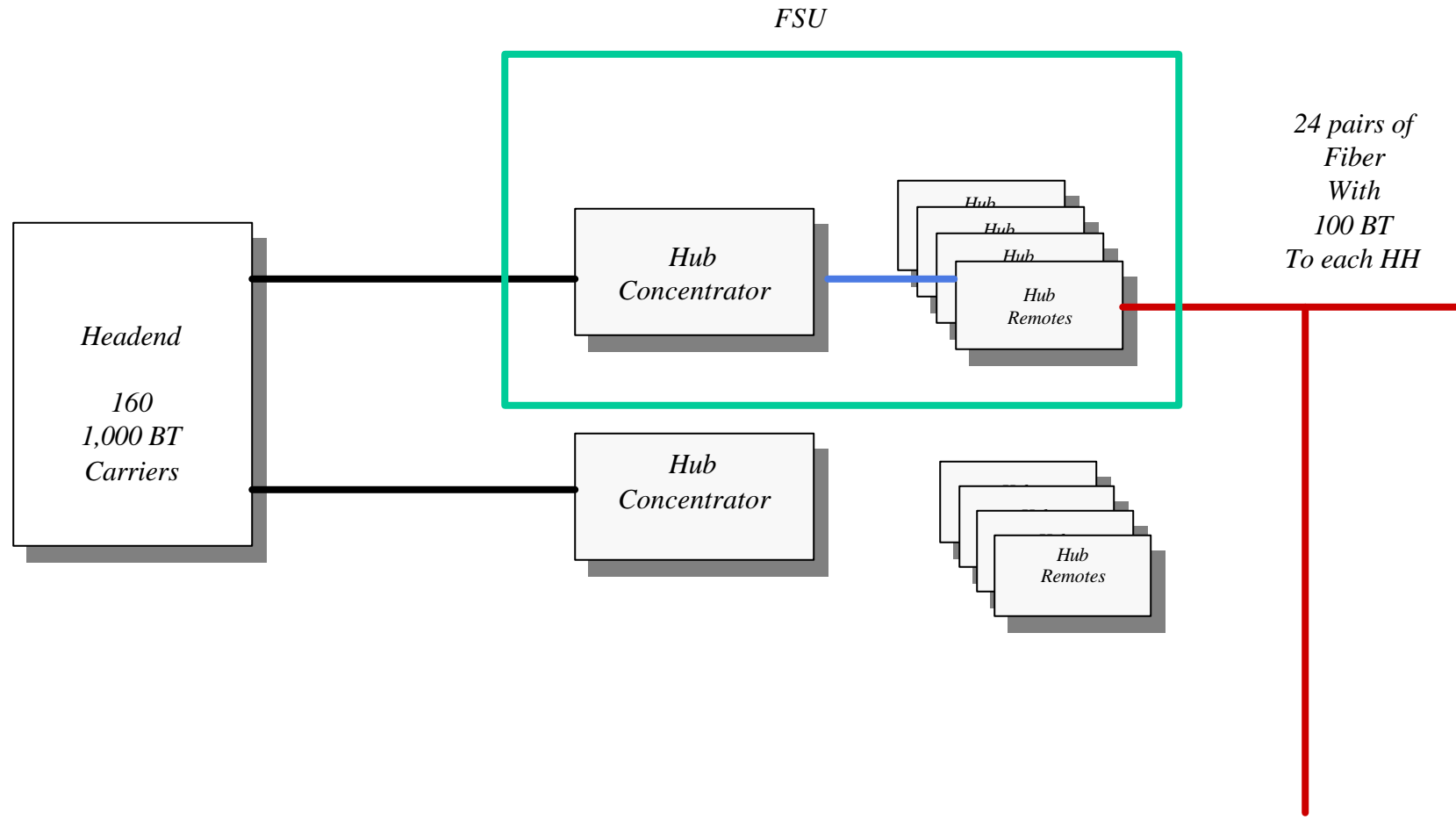
Design Issues



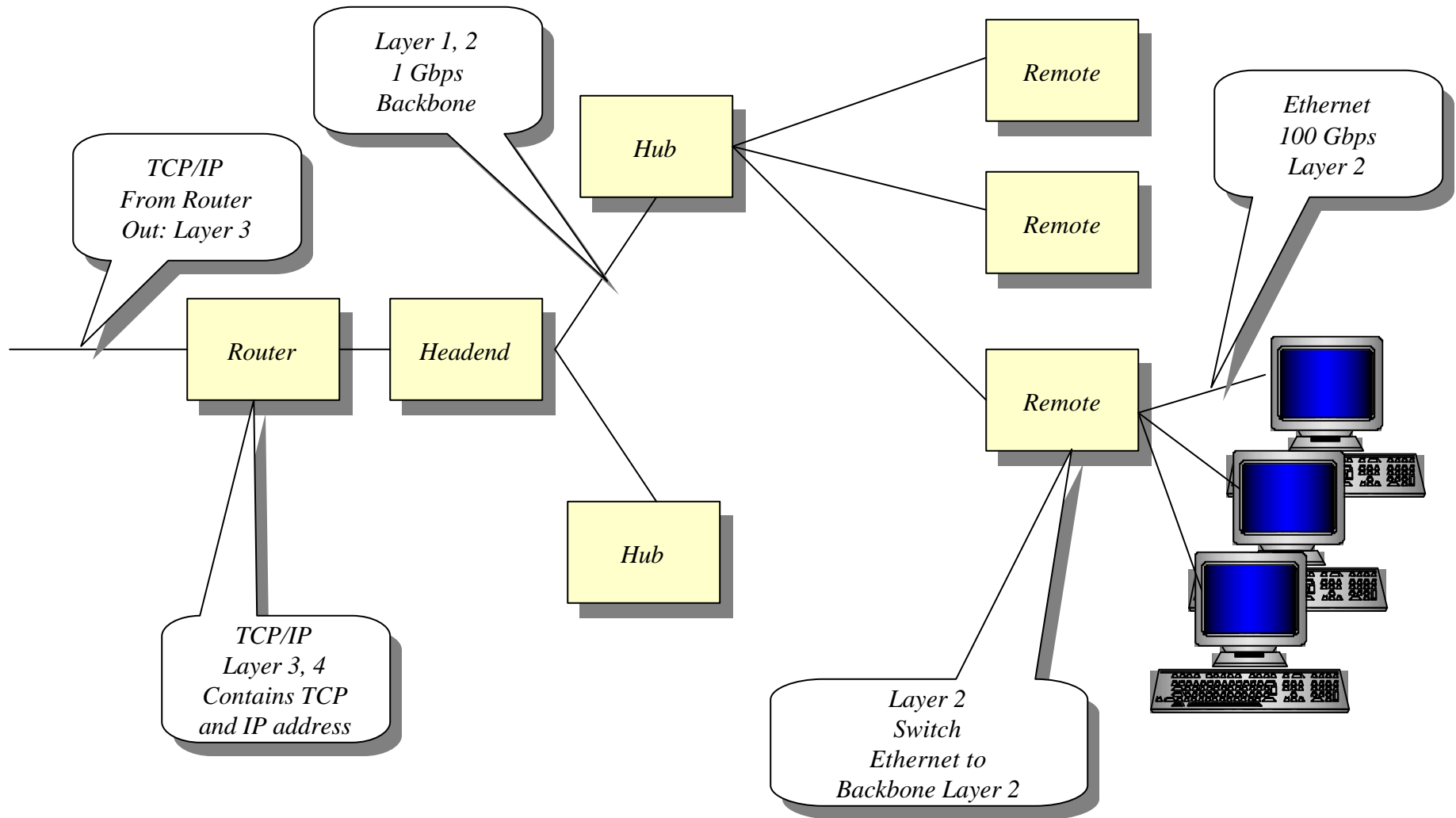
*If low load per HH, then can set 15 HH 317
Per 410, and one 1 Gbps from 410
Back to 3700, with 1 Gbps on in and
1 Gbps on out.*



System Elements GigE



GigE Architecture

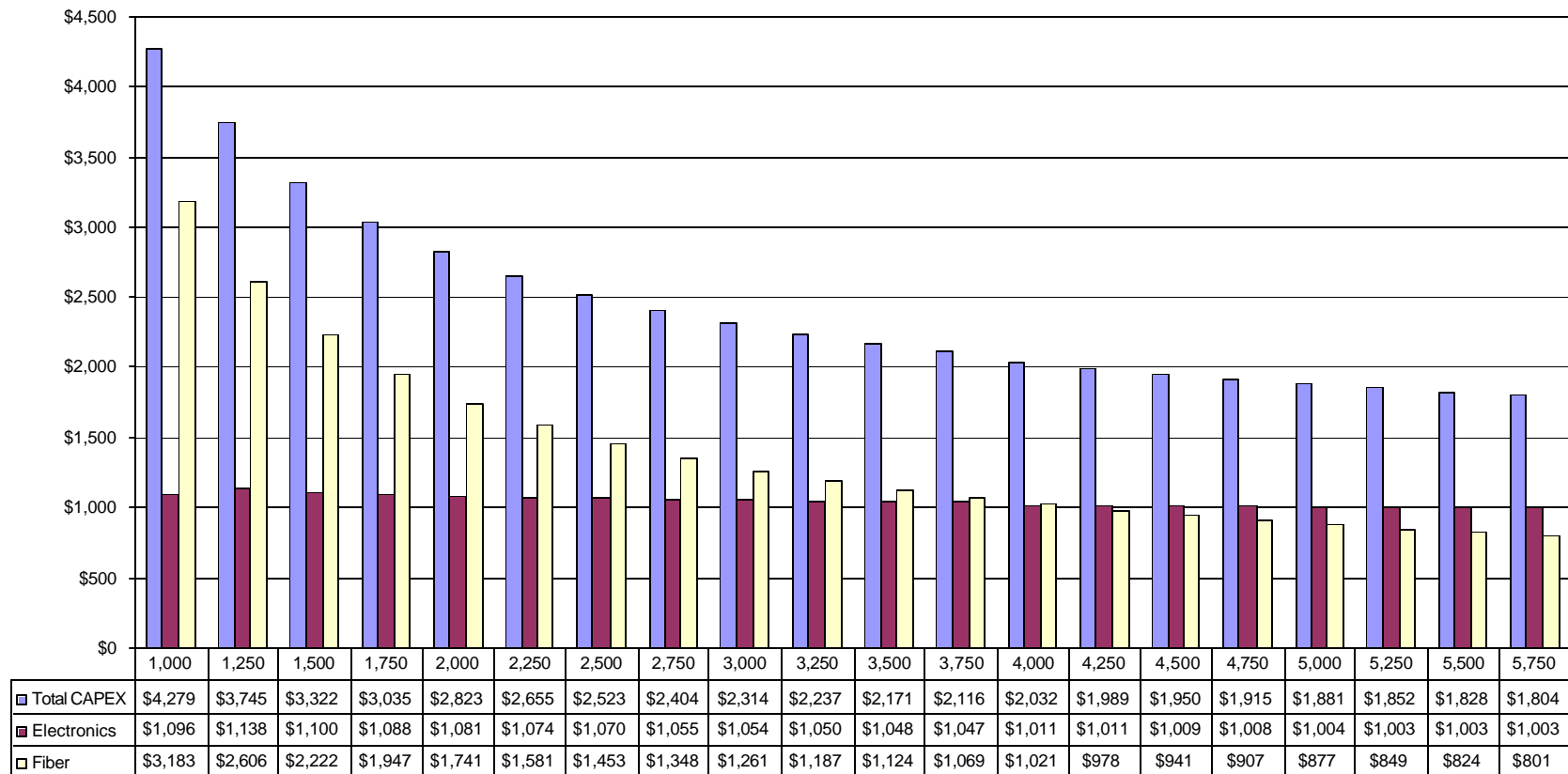


CAPEX Gige

<i>Unit</i>	<i>Fixed</i>	<i>Variable</i>	<i>Capacity</i>	<i>Example for 1,000 HH</i>	<i>Per HH CAPEX</i>
EUU, End User Unit		\$1,165	1 per user	\$1,165,000	\$1,165
Remote		\$7,695	Supports 4 1 Gbps BT and 24 100 Mbps port pairs with 10 km range	\$320,625	\$321
Concentrator		\$6,995	Supports 16 1 Gbps BT connections at 10 km range	\$34,975	\$35
Headend	\$190,000	\$12,000	Supports 160 1 Gbps BT connections	\$202,000	\$202
Number HH				1,000	
Total				\$1,722,600	
Total per HH				\$1,723	\$1,723
Total Fiber Miles		\$25,000	In town of 80 miles with 70% coverage	\$1,400,000	\$1,400
Drop Cost		\$300		300,000	\$300
Total per HH with Fiber					\$3,423

CAPEX per HH GigE

CAPEX per HH vs No HH (GigE)



CAPEX GigE LITE

CAPEX per HH vs No HH (GigE)

