FTTH Network Design Information and Bill of Materials

Clarksville Light and Water (CLW) currently operates a 17+ mile 288 fiber network ring throughout the City of Clarksville, AR. The fiber network currently provides service for CLW Utility operations and also provides retail broadband service to business and community anchor institution locations. The existing 288 fiber ring is 95% aerial construction and is installed in the communications space (40" below neutral) on CLW utility poles.

The Clarksville Light and Water Fiber to the Home (FTTH) network design is a Gigabit Passive Optical Network (GPON) design enabling FTTH broadband service throughout the entire City of Clarksville, AR and some adjacent outlying areas. Construction of the FTTH network inside the city limits of Clarksville will primarily be aerial strand and lash construction in the communications space while construction in the outlying areas will be buried construction.

Besides the existing CLW fiber both CenturyLink and SuddenLink have attachments to CLW utility poles. It is anticipated that some rearrangement of the existing attachments may be required by the contractor in order to complete construction of the CLW FTTH network, CLW has existing pole attachment agreements which allows CLW to complete rearrangement modifications. CLW will work to ensure the contractor has a clear path for fiber construction.

The intent with a Construction Management (CM) approach to the project is for the selected CM to participate in the determining the final design. That said based upon the current stage of planning the following information is the current plan:

The design utilizes a 1x32 split and Passive Optical Network (PON) cabinets at strategic locations around the City of Clarksville. All PON optical equipment is designed to be located at the Clarksville Light and Water Network Operations Center (NOC).

The Contractor will be required to complete all mainline and lateral fiber route construction, including installation of multi-port assemblies (2,4,6,8,12 port configurations) that will transition from splice points in forward and back spans to allow for future drop installation.

Construction will be completed by PON serving area to allow for CLW to effectively follow Make Ready construction and marketing efforts conducted by CLW.

All construction will conform to RUS Construction practices and will be comprised of units determined according to CLW and the Engineer. All construction will conform to CLW Electric System Construction Standards as well as all applicable State and Local codes and the National Electric Safety Code (NESC).

All As-Built red line construction sheets will be provided as documents in the format determined by CLW and the Engineer so that Construction Units Placed can be accurately documented for review and payment by CLW and so that creation of As-Built records can be easily accomplished.

Drop installations are designed to be aerial or buried and will originate from multi-port assembly's that are part of the initial design; with drop installations being completed by the Contractor. Drop installations will be concentrated in areas where mainline construction is

actively occurring and CLW has completed pre-marketing of their service. Drop installations for service areas where mainline construction and initial drop installations have already occurred will be grouped into packages that best create efficiency for the contractor and still meet service installation requirements of CLW customers.

Drop installations completed by the contractor will consist of:

- Buried or Aerial fiber drop cable placement.
- Bonding and grounding required at the customer/business premise.
- Optical Network Unit (ONU) enclosure installation.
- Connection of the fiber drop to the MultiPort Assembly.
- Customer drop splicing.

Construction Plan by PON Serving Area and Expected Timeframe for Completion

	Route Miles:	Customer Locations:
NOC/PON 1	9.67	578
PON 2	4.93	405
PON 3	7.53	379
PON 4	0 .08	0
PON 5	4.38	353
PON 6	5.75	377
PON 7	9.11	471
PON 8	11.47	266
PON 9	4.64	375
PON 10	4.03	215
PON 11	6.19	304
PON 12	10.54	194
PON 13	7.42	412
PON 14	3.86	193
SW Substation	0.00	0

5 Additional Areas Outside of Service Territory

	Route Miles:	Customer Locations:
PON 21	5.77	153
PON 64	4.95	118
PON 103	4.55	108
PON 352	5.49	99
PON CRAWFORD	3.60	75

Below find information regarding a Design Level Bill of Materials (BOM) as compiled from the initial FTTH Network Design.

Mainline and Lateral Fiber Route Miles (Initial Design)

Aerial Fiber: 65 miles

Buried Miles: 25 miles

% Aerial: 72%

% Buried: 28%

# of poles for strand attachment: 3,531

Mainline and Lateral Fiber Route Miles (5 Additional Areas)

Aerial Fiber: .11 miles

Buried Miles: 26 miles

% Aerial: .3%

% Buried: 99.7%

# of poles for strand attachment: 3

Total Mainline and Lateral Fiber Route Miles

Aerial Fiber: 65 miles

Buried Miles: 51 miles

% Aerial: 56%

% Buried: 46%

# of poles for strand attachment: 3534

Cable Footages

	Design Footage:	Additional 5 Areas Design Footage:	Total Footage:
CO288	20,961	0	20,961
CO216	25,319	0	25,319
CO144	34,680	0	34,680
CO96	44,613	0	44,613
CO72	44,890	0	44,890
CO48	16,202	561	16763
CO24	26,254	0	26,254
CO12	23,265	0	23,265
BFO12	32,297	43,630	75,927
BFO24	34,766	12,005	46,771
BFO48	37,086	11642	48,728
BFO72	5,770	28,733	34,503
BFO96	10,049	31,770	41,819
BFO144	3,951	11,010	14,967
BFO216	3,830	0	3,830
BFO288	2,650	0	2,650

Multiport Assemblies

	Quantity	Additional 5 Areas	Total
2-Port	169	169	338
4- Port	459	77	536
6-Port	221	6	227
8-Port	114	0	114

12-Port	33		0		33
Total MultiPort Assemblies:	996	Total:	252	Total:	1248

Handhole/Splice Cases/Pedestals

	Quantity	Additional 5 Areas	Total
Small Splice Case (6 port <FO48)	89	0	89
Medium Splice Case (6 port < FO144)	138	2	140
Large Splice Case (8 port > FO144)	87	0	87
Large Handhole (LxWxH)	15	0	15
Metal BD5 Pedestal (MultiPort Use)	439	274	713

Splicing (Estimated):

	Quantity	Additional 5 Areas	Total
Cable – Cable Splices:	11,800	1946	13760
Cable – Multi-Port Splices:	4,800	682	5482