DIY Fiber Estimating

This sequel to "DIY Fiber Mapping" shows how to develop a quick cost estimate that can either close a deal or end an inquiry by eliciting sticker shock.

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The May-June 2016 issue of **Broadband Communities** featured an article on DIY fiber mapping. In this second and final part of the "DIY" series, I will explain how to use the route measurements derived in the mapping process as inputs into cost estimates for proposed fiber network extensions. I will present a quick-and-dirty method, a slightly cleaner method and a more professional method for producing cost estimates for fiber routes.

RECAPPING DIY FIBER MAPPING

The point of a ballpark estimate is to qualify a lead before investing significantly into design and planning. A ballpark estimate is most effective when it takes the least amount of effort and has the quickest turnaround compared with a complete design and professional estimate. In the end, a ballpark estimate should either close a deal or elicit sticker shock.

Estimated linear measurements for the underground and aboveground distances a fiber route may travel are essential metrics for completing an outside-plant (OSP) bill of materials worksheet. You'll need a mapping tool to capture these measurements. The previous article illustrated mapping with Google My Maps because it is simple, available on desktop and mobile platforms and, most important, free.

To use Google My Maps for mapping a route, start by creating a map and importing the access points from which fiber routes will originate. Next, identify problem areas and strategic areas on the map so engineers can design routes that avoid or gravitate to these areas. Then, map routes by manually drawing the line on the map and/or using the driving directions tools. Finally, use any of a variety of tools to measure the distances of the underground and aboveground segments.

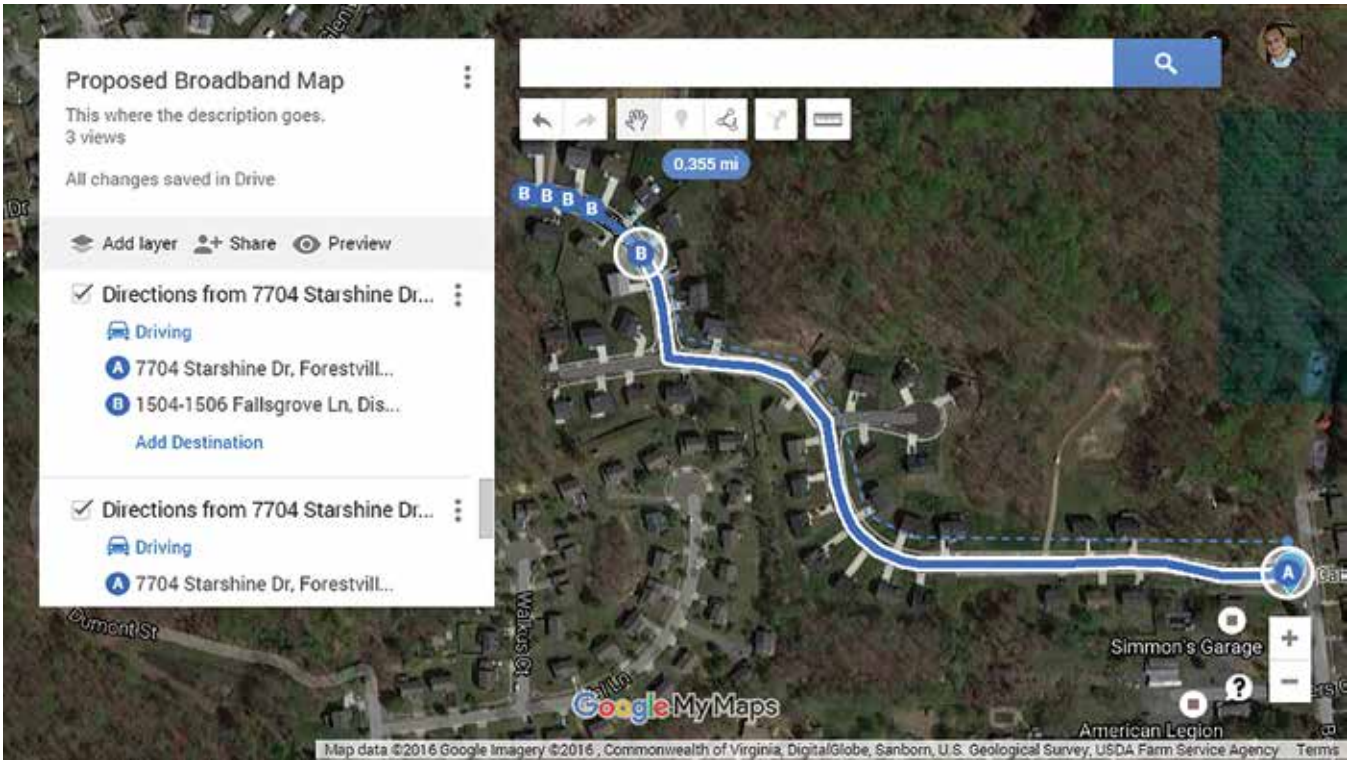
REALITY CHECK

Though the last article showed in detail how to estimate underground and aboveground distances, it didn't discuss the pros and cons of different measurement methods. Whether you measure a proposed route on a map or a completed cable route using its optical properties, be aware of the differences among these methods.

Measuring as the crow flies. Drawing a straight line between two points on a map is an ill-advised way to calculate route distance. Although it takes less effort than any other method of calculating distance, it ignores the natural terrain and will have a gross margin of error.

Measuring the GIS distance. Drawing a multipoint line on a map that respects public rights-of-way and measuring that line with common GIS tools is an acceptable way to capture the basic route distance. However, it does not account for the physical properties of the cables that the lines represent.

Calculating the engineered distance. A professional OSP engineer is responsible for designing all aspects of the routes to meet requirements. The engineer is tasked with



A map of a proposed fiber route is the starting point for a cost estimate.

identifying a viable route, a list of materials and the scope of the effort required to install a cable from one point of the network to another. OSP engineers have a variety of ways to calculate the linear distances of cable, innerduct, trenching, tree trimming and other per-foot materials and services required to install a new fiber route.

Engineered distances are almost always longer than GIS distances. Basic GIS distance measurements ignore physical, real-world cable properties such as slack loops, the sag between utility poles, vertical runs within buildings, the vertical transition from manholes to utility poles and many more factors. An OSP engineer's calculated distances incorporate all those factors.

Measuring the installation distance. Measurement marks are often printed onto a cable during manufacturing or applied during installation. If a cable has these marks, I advise that your cable installer record them. Subtract the smaller meter mark from the larger one to get an accurate cable distance.

Measuring with an OTDR. An OTDR or optical time domain reflectometer is a device used to test the quality and characteristics of fibers in a cable. One characteristic it can capture is length.

One of my clients went through a lengthy audit process of all its cable. Part of that process included collecting the different measurement data, most notably the installed distance versus the OTDR distance. The client discovered that the engineers and cable installers both put excess cable in their design and planning so that they didn't risk the chance of having too little cable to work with by the time they got to splicing. Once that discovery was made, the two teams worked together to come up with a more accurate padding factor that eliminated waste and still left room for mistakes.

The point of listing all these methods is not to inundate you with conflicting information but to make you aware that you will encounter a variety of measurement data sets. Don't be intimidated by all this data; capture it as you go and decide what to do with it at a later date. This data will allow your organization to make intelligent business process decisions in the short term and the long term.

ESTIMATING PER-FOOT COSTS

Two variables are required to calculate a quick-and-dirty estimate: distance and cost per foot (or meter). Having already covered distance at length (pun intended), I will now show how to determine the cost per unit by relying on historical data, industry research or support from a consultant.

Using historical data. If your organization has been in business long enough to have placed a considerable amount of cable, and if you have a decent set of financial or billing records, you should be able to calculate your own cost per foot by dividing the average cost of an OSP installation by the average route distance.

Quick Ballpark Estimate			
Estimated Route Distances by Type	**Distance (Feet)**	**Cost Per Foot**	**Total**
Underground	1,000	$13.00	$13,000
Aboveground	500	$7.00	$3,500
Indoor	300	$5.00	$1,500
Total Route Distance	**1,800**		**$18,000**

A quick-and-dirty estimate can be used for in-house discussions about whether to proceed further.

One approach is to gather a sample set of all costs associated with a variety of route types, such as underground, aboveground and indoor. Create a spreadsheet to track each route and identify the route type, job cost and route distance. Note any exceptional costs, such as trenching or adding a new utility pole, to determine whether these are rare or common expenses. Decide whether to incorporate engineering costs or fixed costs such as permitting.

Researching industry averages. A Google search for "fiber install cost per foot" is a great starting place. Don't underestimate the value of speaking to other OSP professionals in the same region to find out about the physical hurdles of placing fiber plant in your area.

Hiring a consultant. Last but not least, an organization can hire a reputable engineering firm to help determine the average cost per foot,

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Total Route Distance	**1,800**		**$18,000.00**

Improved Route Distances	Distance (Feet)
Total Route Distance (Calculated From Map)	1,800
Slack Spans and Coils - Underground (50' Every 500')	100
Slack Spans and Coils - Aerial (50' Every 1,000')	25
Slack Spans and Coils - Indoor (50' Every 100')	150
Total Estimated Cable Length	**2,075**

Ballpark Estimate With Improved Route Distances			
Estimated Route Distances by Type	**Distance (Feet)**	**Cost Per Foot**	**Total**
Underground	1,100	$13.00	$14,300.00
Aboveground	525	$7.00	$3,675.00
Indoor	450	$5.00	$2,250.00
Total Route Distance			**$20,225.00**

Accounting for items such as slack spans and coils yields an improved estimate that may be shared with the customer.

Detailed Estimate						
ID	Category	Unit Name	Unit	Cost	Quantity	Total
100	Professional Services	Engineering Drawings of Proposed Route	Per Foot	$ 250.00	1	$ 250.00
101	Professional Services	Design Review/Approval by Professional Engineer	Per Page	$ 100.00	5	$ 500.00
102	Professional Services	Management Review and Approval	Per Job	$ 100.00	1	$ 100.00
103	Professional Services	Cable Splicing and Patching	Per Hour	$ 100.00	4	$ 400.00
104	Professional Services	Network Engineer Logical Network Design	Per Hour	$ 200.00	1	$ 200.00
105	Professional Services	Hardware Installation, Service Termination	Per Hour	$ 50.00	8	$ 400.00
106	Professional Services	[Placeholder]	TBD	$ 1.00	0	$ -
107	Professional Services	[Placeholder]	TBD	$ 1.00	0	$ -
108	Professional Services	[Placeholder]	TBD	$ 1.00	0	$ -
109	Professional Services	[Placeholder]	TBD	$ 1.00	0	$ -
110	Professional Services	[Placeholder]	TBD	$ 1.00	0	$ -
						$ -
200	Indoor Installation and Construction	Indoor Pull Box	Each	$ 1.00	0	$ -
201	Indoor Installation and Construction	Fiber Patch Panel	Each	$ 1.00	0	$ -
202	Indoor Installation and Construction	Single Mode 12 Strand Fiber Cable	Per Foot	$ 0.50	2075	$ 1,037.50
203	Indoor Installation and Construction	Multi Mode 12 Strand Fiber Cable	Per Foot	$ 1.00	0	$ -
204	Indoor Installation and Construction	Telco Relay 2 Post Rack	Each	$ 1.00	0	$ -
205	Indoor Installation and Construction	Wall Mount Cabinet	Each	$ 200.00	1	$ 200.00
206	Indoor Installation and Construction	Plenum Innerduct	Per Foot	$ 0.25	50	$ 12.50
207	Indoor Installation and Construction	Corrugated Innerduct	Per Foot	$ 1.00	0	$ -
208	Indoor Installation and Construction	Rack Mount Power Inverter	Each	$ 1.00	0	$ -
209	Indoor Installation and Construction	UPS Battery Backup	Each	$ 1.00	0	$ -
210	Indoor Installation and Construction	24 Port Switch	Each	$ 750.00	1	$ 750.00
211	Indoor Installation and Construction	Install Cable	Each	$ 5.00	450	$ 2,250.00
212	Indoor Installation and Construction	[Placeholder]	TBD	$ 1.00	0	$ -
213	Indoor Installation and Construction	[Placeholder]	TBD	$ 1.00	0	$ -

A detailed estimate should be prepared by an OSP engineer.

using either historical data or regional averages.

CREATING THE ESTIMATE

Download and open the DIY Fiber Estimating spreadsheet from www.Utility-LINE.com/diy-map to get started, then jot down your aboveground and underground measurements.

Jot down your aboveground and underground per unit pricing. Don't worry if you don't have this yet – the sample spreadsheet includes values to help you get started. Explore the three tabs within the spreadsheet: "1-Quick Ballpark Est.," "2-Ballpark Est." and "3-Detailed Est."

Quick ballpark estimate. The quick ballpark estimate simply multiplies the aboveground, underground and indoor distances times their respective costs per foot and sums the three costs together for a grand total. Depending on your organization's acceptable threshold of error, this may be sufficient as a price to share with your team to determine whether you should proceed.

Improved ballpark estimate. This ballpark estimate offers calculations for slack spans, coils and vertical runs as a means to better capture the real-world characteristics of a cable route. The spreadsheet is unlocked so you can alter the calculations to fit your environment and service area.

For many, an improved ballpark estimate is good enough. This might be the type of estimate to share with a customer verbally, with the understanding that a full design is required to proceed. That is, of course, up to the discretion of the organization and should come with the caveat that the sample spreadsheet provided is just that – a sample.

Detailed estimate. The detailed estimate will almost always be completed by an OSP engineer. It will be based on distance measurements generated following the methods provided earlier but not on prorated per-unit pricing. An OSP engineer uses measurements and any available information to tweak quantities of materials and labor. All the unit types and costs should be established in advance and agreed upon by key team members.

SUMMARY

An essential component to qualifying a lead is determining whether the organization has enough money to pay for your product or services. Though most broadband providers advertise monthly subscription costs, the costs of initial install and setup often vary greatly. Streamlining the fiber mapping and estimating process can shorten the vetting process, help standardize the sales cycle and reduce the workload of OSP engineers. ❖

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