

Certify Fiber Fast

How Fluke Networks' Fiber Adapters Beat the Competition

In today's competitive environment, the cabling contractors that win the most business are those that can repeatedly offer the most competitive price on a per drop basis. To be price competitive while turning a profit, contractors must minimize costs. One of the costs of installing a cabling system is testing. Testing is required because building and network owners seek proof that the cabling infrastructure was properly installed. A valid certification test report serves as this proof.

To minimize testing costs, you want to test the greatest number of links in the shortest period of time. This can be accomplished either by employing lots of laborers working simultaneously with low priced test tools or by using more advanced tools that require little labor.

This paper describes the advantages of using advanced test sets engineered to test quickly and efficiently. Two different testers will be compared: the Fluke Networks DSP-FTA420S multimode fiber test adapters for the DSP-4000 series and test adapters for another brand of Cat 5e/6 tester. (See Table 1.) The OMNIFiber MM adapters for the OMNIScanner series utilize the same technology as the DSP-FTA420S and performance will be similar.

Tale of two adapters

The DSP-FTA420S and the Adapters B are both fiber adapter sets that convert a Cat 5e/6 tester into a fiber certification tool. On the surface, they may appear similar. Closer examination reveals differences that significantly affect test time.



Feature	DSP-FTA420S	Adapters B
Number of adapters per set	2: 1 for main and 1 for remote	2: 1 for main and 1 for remote
Adapter 1	InGaAs receiver (Rx) 850 nm LED source (Tx) 1300 nm LED source (Tx) 	Receiver (Rx) 850 nm VCSEL source (Tx)
Adapter 2	InGaAs receiver (Rx) 850 nm LED source (Tx) 1300 nm LED source (Tx)  (note: adapters 1 and 2 are identical and interchangeable)	Receiver (Rx) 1300 nm FP laser source (Tx) (note: adapters 1 and 2 are not identical)
Reference measurement time	11 seconds	41 seconds
Autotest time	11 seconds	50 seconds

Table 1 - Comparing the DSP-FTA420S and the Adapters B

Testing a fiber pair

Both the DSP-FTA420S and Adapters B test a pair of fibers in one Autotest operation. After making a reference power measurement, the adapters are connected to the fibers under test. The DSP-FTA420S tests each fiber at both 850 nm and 1300 nm as illustrated in **Figure 1**. Adapters B test one fiber at 850 nm and the other at 1300 nm as illustrated in **Figure 2**.

The following examples illustrate how these differences translate into test efficiency and speed.

Example 1: horizontal link at 850 nm in one direction

Cabling = 12 fiber 50/125 cable from IC to work area, SC connectors

Requirement = test each fiber at 850 nm in one direction

The DSP-FTA420S tests each fiber of the pair at 850 nm and 1300 nm. You can select a PASS/FAIL limit that ignores the 1300 nm measurement if desired.

Adapters B test only one fiber of the pair at 850 nm. Therefore, to obtain an 850 nm measurement of each fiber, you must test each fiber with the 850 nm adapter. You can accomplish this by testing all fibers, swapping the order of the Tx and Rx fibers at each end, and testing all fibers again. This effectively eliminates the productivity gains associated with pair testing and dramatically increases test time.

(See Table 2.)

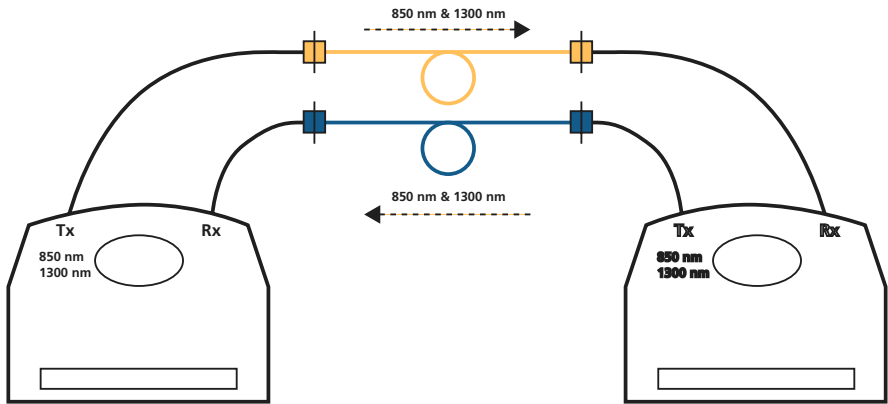


Figure 1 - Testing fiber pair with DSP-FTA420S

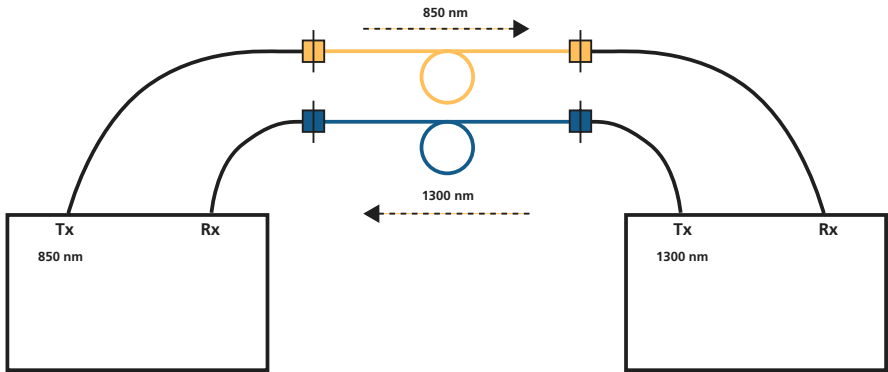


Figure 2 - Testing fiber pair with Adapters B

Step	DSP-FTA420S	Adapters B
1. Instrument set-up	180 seconds	240 seconds
2. Set reference	11 seconds	41 seconds
3. Test and save results	120 seconds	354 seconds
4. Swap Tx and Rx fibers	Unnecessary	6 seconds
5. Test and save results	Unnecessary	354 seconds
Total test time	311 seconds 5 min: 11 seconds	995 seconds 16 min: 35 seconds

Table 2 - Horizontal link at 850 nm in one direction

Example 2: backbone link at 850 nm and 1300 nm in one direction

Cabling = 24 fiber 50/125 cable from MC to IC, SC connectors

Requirement = test each fiber at 850 nm and 1300 nm in 1 direction

The DSP-FTA420S tests each fiber of the pair at both 850 nm and 1300 nm. Simply connect and test.

Adapters B test one fiber of the pair at 850 nm and the other fiber at 1300 nm. Therefore, to test each fiber at both wavelengths requires testing all pairs, swapping the order of the Tx and Rx fibers at each end, and testing the pairs again. This technique doubles the overall test time. (See Table 3.)

Example 3: backbone link at 850 nm and 1300 nm in two directions

Cabling = 24 fiber 50/125 cable from MC to IC, SC connectors

Requirement = test each fiber at 850 nm and 1300 nm in two directions

The DSP-FTA420S tests each fiber of the pair at both 850 nm and 1300 nm. The fibers are tested one way in opposite directions. Testing both fibers in both directions requires testing the pairs, swapping the order of Tx and Rx fibers at both ends, and testing the pairs again. The bi-directional results are displayed on the tester and on the test report.

Adapters B test one fiber of the pair at 850 nm and the other fiber at 1300 nm. Testing each fiber in one direction at both wavelengths requires testing the pairs, swapping the order of the Tx and Rx fibers at both ends, and testing the pairs again. Now to test in the opposite direction you must physically switch the adapters by walking the 850 nm adapter to its opposite end and the 1300 nm adapter to its opposite end and repeating the whole test process again. (See Table 4.)

Step	DSP-FTA420S	Adapters B
1. Instrument set-up	180 seconds	240 seconds
2. Set reference	11 seconds	41 seconds
3. Test and save results	246 seconds	714 seconds
4. Swap Tx and Rx fibers	Unnecessary	6 seconds
5. Test and save results	Unnecessary	714 seconds
Total test time	437 seconds 7 min: 17 seconds	1715 seconds 28 min: 35 seconds

Table 3 - Backbone link at 850 nm and 1300 nm in one direction

Step	DSP-FTA420S	Adapters B
1. Instrument set-up	180 seconds	240 seconds
2. Set reference	11 seconds	41 seconds
3. Test and save results	246 seconds	714 seconds
4. Swap Tx and Rx fibers	6 seconds	6 seconds
5. Test and save results	246 seconds	714 seconds
6. Walk adapters to opposite ends	Unnecessary	45 seconds
7. Test and save results	Unnecessary	714 seconds
8. Swap Tx and Rx fibers	Unnecessary	6 seconds
9. Test and save results	Unnecessary	714 seconds
Total test time	689 seconds 11 min: 29 seconds	3194 seconds 53 min: 14 seconds

Table 4 - Backbone link at 850 nm and 1300 nm in two directions

Example 4: backbone link at 850 nm and 1300 nm in one direction with MT-RJ connectors

Cabling = 24 fiber 50/125 cable from MC to IC, MT-RJ connectors

Requirement = test each fiber at 850 nm and 1300 nm in 1 direction

The DSP-FTA420S tests each fiber of the pair at both 850 nm and 1300 nm. There is additional set-up time due to the MT-RJ connectors.

Adapters B test one fiber of the pair at 850 nm and the other fiber at 1300 nm. Therefore, to test each fiber at one wavelength requires testing a pair at one wavelength, physically switching the adapters by walking the 850 nm adapter to its opposite end and the 1300 nm adapter to its opposite end and testing each fiber at the other wavelength. Note that the MT-RJ connector precludes swapping the Tx and Rx order. (See Table 5.)

DSP-FTAs are fastest

It is clear from these examples that the DSP-FTA420S is significantly faster than Adapters B under all scenarios (See Table 6 and Figure 3). The DSP-FTA420S total test time is 22% to 31% of Adapter B.

DSP-FTAs save money

The time saved testing can be directly converted into cost savings. The savings realized depend upon the labor rate. Table 7 lists savings for labor costs (including employer-paid benefits) of \$40/hr, \$60/hr and \$80/hr for a team of two technicians.

Step	DSP-FTA420S	Adapters B
1. Instrument set-up	210 seconds	270 seconds
2. Set reference	11 seconds	41 seconds
3. Test and save results	246 seconds	681 seconds
4. Walk adapters to opposite ends	Unnecessary	45 seconds
5. Test and save results	Unnecessary	681 seconds
Total test time	434 seconds 7 min: 14 seconds	1718 seconds 28 min: 38 seconds

Table 5 - Backbone link at 850 nm and 1300 nm in two directions with MT-RJ connectors

	DSP-FTA420S	Adapters B	Test time reduction using DSP-FTA
Example 1: Horizontal	5:11	16:35	69%
Example 2: Backbone 1 direction	7:17	28:35	75%
Example 3: Backbone 2 direction	11:29	53:14	78%
Example 4: Backbone MT-RJ	7:14	28:38	75%

Table 6 - Overall test time comparison

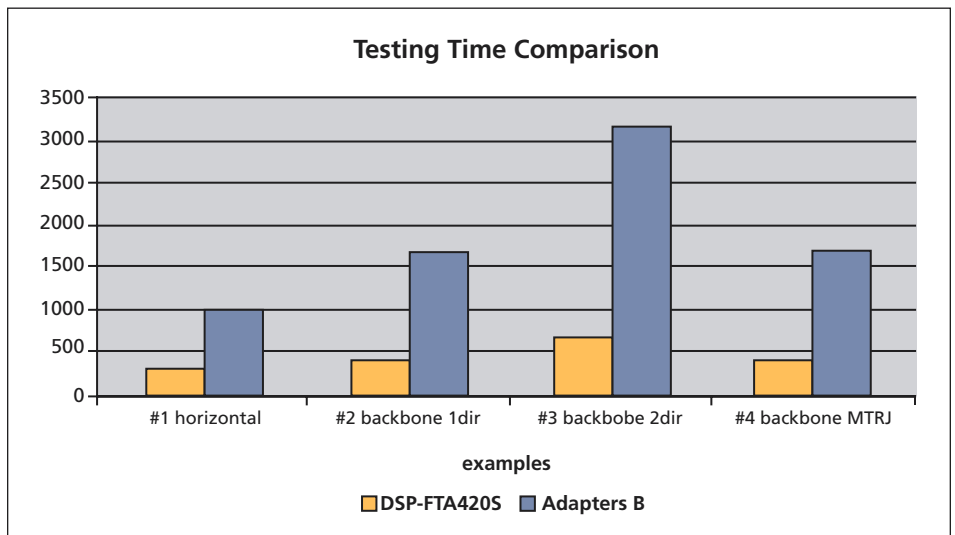


Figure 3 - Test time comparison

	DSP-FTA420S			Adapters B			Savings using DSP-FTA		
Labor rate:	\$40/hr	\$60/hr	\$80/hr	\$40/hr	\$60/hr	\$80/hr	\$40/hr	\$60/hr	\$80/hr
Example 1:	\$3.46	\$5.18	\$6.91	\$11.06	\$16.58	\$22.11	\$7.60	\$11.40	\$15.20
Example 2:	\$4.86	\$7.28	\$9.71	\$19.06	\$28.58	\$38.11	\$14.20	\$21.30	\$28.40
Example 3:	\$7.66	\$11.48	\$15.31	\$35.49	\$53.23	\$70.98	\$27.83	\$41.75	\$55.67
Example 4:	\$4.82	\$7.23	\$9.64	\$19.09	\$28.63	\$38.18	\$14.27	\$21.40	\$28.53

Table 7 - Cost savings

DSP-FTAs are the best value

The price of the DSP-FTA420S is higher than Adapters B due to the FTA's advanced dual wavelength technology. The price difference is quickly recovered by the savings you obtain using the DSP-FTA420S. The following analysis assumes a labor rate of \$60/hour for two technicians and 850 nm and 1300 nm one direction testing (example 2).

Typical price (U.S.D)

DSP-FTA420S	\$4000
Adapters B	\$2800
Difference	\$1200

You only need to test 56 24-fiber backbone cables (at 850 nm and 1300 nm in one direction) to make up this price difference.

$$\text{\$1200} \div \text{\$21.30/cable} = \textbf{56 cables}$$

(1346 fibers)

How quickly can you recoup the difference depends upon how often you test fiber cable.

A contractor that on average tests 2 cables (48 fibers) per week makes up the price difference in 28 weeks. A contractor that averages 10 cables (240 fibers) per week makes up the price difference in only 6 weeks. The interval could be even quicker if the labor rate is higher or the testing requirements are more rigorous (two direction testing as illustrated in example 3 for example). (See **Table 8 and Figure 4.**)

Assuming that this same contractor averages 3 cables (72 fibers) per week and tests 24 fiber backbone cables, he will save \$13,291 over 4 years using the DSP-FTA420S as compared to Adapters B. This more than offsets the DSP-FTA's higher initial price and makes the DSP-FTA420S the best value for your money.

Cables tested/week	Fibers tested/week	Weeks required for savings = price difference
1	24	56
2	48	28
3	72	19
5	120	11
10	240	6
15	360	4
20	480	3
30	720	2
50	1200	1

Table 8 - Time required to realize savings equivalent to price difference

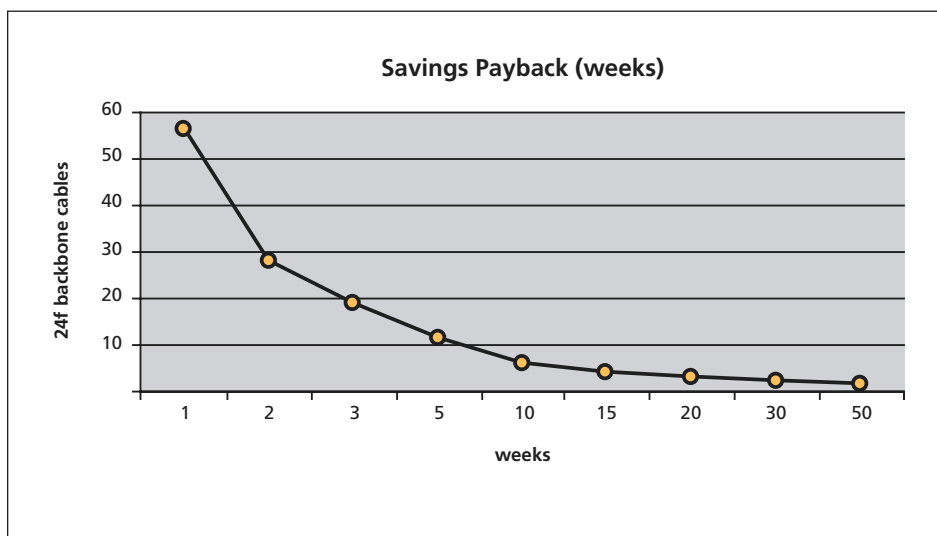


Figure 4 - Time required to realize savings equivalent to price difference.

Years	Weeks	DSP-FTA420S savings if testing averages 3 24-fiber backbone cables (72 fibers) per week
1	52	\$3,323
2	104	\$6,646
3	156	\$9,968
4	208	\$13,291
5	260	\$16,614

Table 9 - Savings using DSP-FTA420S as compared to using Adapters B

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