

Comparison Matrix - 1

	Fibrejack	F07/PN	Direct	VF-45	LC	Mini-MT
Mechanical Spec reference	TIA FOCIS-6, IEC NWI Prop Prop TIA-568-A	JIS C-5976 / IEC 1754-16	T R -41 pending	PN-3968, FO-6.3, FOCIS 7 PN-4122 (TIA 47500AC)	TIA FO6.3 FOCIS, IEC 86B WG6	TIA PN- 4107; IEC NWIP accepted
Patent letter filed with IEEE	Yes	? / ?	Yes	In process, ANSI	In process	No, but willing
System cost compared to UTP-5	1.5 x - 1.8 x	comparable / ?	1.5x	1.48X	1.2X to 1.5X	2-3X
Connector cost compared to RJ-45	Current: 4 xNear future: 2.0 x	see note		1x	2X	see note
Cost per optical port	2 x	see note	1.25x	1x	1.25X	see note
Cable assemblies cost c/f UTP-5	2.5 x	equal	1.5x	1.85x	1.5X	equal (POF)
20 yr lifetime	Proven	not tested / ?	Yes	Yes	Yes	TBD
Installation cable termination complexity (describe)	4 mins	x min / x min	8 steps	< 2 min	2-5 min	Will be easy
Tool cost - professional GOF	(dollars deleted)	see note	same as ST/SC	1/3rd standard fibre kit	Same as SC and ST.	vendor dependent
Tool cost - amateur GOF	(dollars deleted)	see note	35% ST/SC	(dollars deleted)	same as the SC and ST.	vendor dependent
Tool cost - professional POF		see matrix 3	same as RJ-45	N/A	Similar to UTP tooling costs	N/A
Tool cost - amateur POF		see matrix 3	35% of RJ-45	N/A	Similar to UTP tooling costs.	N/A
Maintenance required (describe)	none	Wipe endface / No	none	Minimal cleaning.	Same as SC and ST.	Cleaning
Maintenance advised (describe)	Clean by wiping off ferrules	Wipe endface / cleaning (fiber end alignment hole)	use alcohol	Use HFE solution	Clean before connection.	N/A
Protection from dust etc (describe)	Dust caps, integrated shuttered doors in outlets, etc.	Dust covers included in conn. kit / cap	not required	Spring loaded door for VF-45 socket and slide door for VF-45 plug.	protective cap on the connector and adapter.	Standard covers

Comparison Matrix - 2

	Fibrejack	F07/PN	Direct	VF-45	LC	Mini-MT
Duplex, asymmetric, differentiated (keying etc)	Yes	Yes / Yes	Yes	yes, with RJ-45 latch.	Yes	Yes
Support speeds from 125 MBaud up to 4GBaud	Yes	No (TBD from device mfrs) / TBD	Yes	Yes	Yes	Yes
Suitable for equipment, dongles and wall plates	Yes, fully modular with RJ-45	Yes / Yes	Yes	Yes	Yes	Yes
Enables user-assembled patch cords (NB NOT a requirement)	Yes, all components field terminable	Yes / Yes	Yes	Yes	Yes	No
Size compared with RJ45	same	2X / No	same	comparable	Smaller	Smaller
Worst-case loss (dB)	0.75 dB Actual average: 0.16 dB	2.0 dB / 2 dB	POF 2.0dB GOF TBD	Typical 0.5dB, less than 0.75dB.	max 0.4dB average 0.10 dB	.75dB
Optical performance complies to TIA 568 requirements	Yes	? / ?	POF YES GOF TBD	YES, also IEC.	YES, also IEC and Bellcore	
Suitable for MMF	Yes	Yes- 200/230um HCS / Yes (TBD)	Yes- 50/125 or 62.5/125	YES, 50 and 62.5 micron.	Yes	Yes
Suitable for POF	N/A	Yes- 1000um plastic / Yes	Yes - SI POF or GRIN POF	no	with design work (started)	No
Eye safety issues	Yes (transceiver)	? / No lid	Integral	Spring loaded/ slide doors .	none from laser, safety glasses when installing	None
Physical safety issues	Yes, proven reliable and safe 2.5 mm ferrule technology	No / ?	No exposed fibres in normal use	Bare fiber handling is minimized during installation	UL-94, Bellcore GR-326	None

Comparison Matrix - 3

	Fibrejack	F07/PN	Direct	VF-45	LC	Mini-MT
Tooling estimated costs GOF professional		/ see note	same as ST/SC	similar to the above tool cost	same as ST & SC	Vendor dependent
Tooling estimated costs POF professional		See note.	same as RJ-45		Similar to UTP tooling costs	Vendor dependent
Tooling estimated costs GOF amateur		/ see note	35% of typical ST/SC	similar to the above tool cost	low cost tool possible	Vendor dependent
Tooling estimated costs POF amateur		See note / see note	35% of typical RJ-45		Similar to UTP tooling costs	Vendor dependent
What is available for GOF	connectors, tools and outlet/enclosures	Conns for 200/230um HCS style fibers /		connectors, adapters, tool kits, enclosures, test	Connectors, adapter, patch cords, enclosures, tool kits	
What is available for POF	N/A	Conns for 1000um POF etc	S200 Jack and plug	N/A	None.	N/A
What is under development for GOF	Quick termination techniques, low cost molded components	/ nothing	Jack and Plug - MAR '98	Amateur tool kit.	Attenuators etc	
What is under development for POF	N/A	/ TRX(S200)	S400 Mar '98 S800/3200 TBD	N/A	Preliminary work on LC connector.	
performance after 500 cycles	<.3 dB change	2.5dB max / TBD	TBD	< 0.3dB change	<0.2dB change	
performance after 1500 cycles	TBD	not rated / questionable	TBD	< 0.3dB change	1000 - <0.2 dB change)	
independent testing (including round robin) info	Dozens of end user sites world-wide	Tested internally t/ not yet	PENDING	Beta's in USA, Europe and Japan.	5 Beta sites	
number of vendors of the proposed connector	Multiple licensees	At least 3 companies / more than 3	3 OTHERS PENDING	3M, several Licensees in process	1 today, potential of 4 by year end	5
transceiver integration information	155 Mbps available, Gigabit in development	? / S100 available, S200 developing	S200 NOW, S400 MAR '98, S800/3200 TBD	10Mbps, 4/16mbps, 100Mbps & Gigabit	Several companies considering manufacturing transceiver.	Yes

NB All costs are based on open-market pricing and are compared to equivalent for UTP-5/RJ-45

Fibrejack Comparison Matrix - 1

	Fibrejack
Mechanical Spec reference	TIA FOCIS-6, IEC New Work Item Proposal, Proposed for TIA-568-A
Patent letter filed with IEEE	Submitted
System cost compared to UTP-5	1.5 x - 1.8 x
Connector cost compared to RJ-45	Current: 4 xNear future: 2.0 x(half the components of TIA-568 standard SC connector)
Cost per optical port	2 x
Cable assemblies cost c/f UTP-5	2.5 x
20 yr lifetime	2.5 mm ferrules have 20 years proven success and reliability in market. Yes, Fiber Jack is warranted
Installation cable termination complexity (describe)	Current: 4 minute quick set adhesive and polishFuture: Strip and crimp fibers individually
Tool cost - professional GOF	N times UTP-5 tools - no power or motors required
Tool cost - amateur GOF	N times
Tool cost - professional POF	
Tool cost - amateur POF	
Maintenance required (describe)	none
Maintenance advised (describe)	Clean by wiping off ferrules
Protection from dust etc (describe)	Dust caps, integrated shuttered doors in outlets, etc.

Fibrejack Comparison Matrix - 2

	Fibrejack
Duplex, asymmetric, differentiated (keying etc)	Yes, polarization assured
Support speeds from 125 MBaud up to 4GBaud	Yes
Suitable for equipment, dongles and wall plates	Yes, fully modular with RJ-45
Enables user-assembled patch cords (NB NOT a requirement)	Yes, all components field terminable
Size compared with RJ45	Yes, exact
Worst-case loss (dB)	Worst case per TIA-568 (0.75 dB); Actual average: 0.16 dB Single-mode average: 0.19 dB
Optical performance complies to TIA 568 requirements	Yes, also provides pull proof non-optical disconnect functionality. Works with all standard, widely available fiber and fiber cable products.
Suitable for MMF	Yes, works also with single-mode fiber
Suitable for POF	N/A
Eye safety issues	Yes, transceivers per Class 1 Eye Safety
Physical safety issues	Yes, proven reliable and safe 2.5 mm ferrule technology

Fibrejack Comparison Matrix - 3

	Fibrejack
Tooling estimated costs GOF professional	
Tooling estimated costs POF professional	
Tooling estimated costs GOF amateur	
Tooling estimated costs POF amateur	
What is available for GOF	10 months world-wide sales including connectors, tools and outlet/enclosures
What is available for POF	N/A
What is under development for GOF	Quick termination techniques, low cost molded components
What is under development for POF	N/A
performance after 500 cycles	No change (<.3 dB per TIA)
performance after 1500 cycles	Not required by TIA, testing underway
independent testing (including round robin) info	Dozens of end user sites world-wide
number of vendors of the proposed connector	Multiple licensees
transceiver integration information	Up to 155 Mbps available,Gigabit speed transceivers under development

F07/PN Comparison Matrix - 1

	F07/PN
Mechanical Spec reference	JIS C-5976 / IEC 1754-16
Patent letter filed with IEEE	? / ?
System cost compared to UTP-5	comparable / ?
Connector cost compared to RJ-45	see note
Cost per optical port	see note
Cable assemblies cost c/f UTP-5	equal
20 yr lifetime	not tested to 20 year life / ?
Installation cable termination complexity (describe)	Standard epoxy, crimp, and either hot knife or quick polish of POF / dry-non-polish (POF)
Tool cost - professional GOF	see note
Tool cost - amateur GOF	see note
Tool cost - professional POF	see matrix 3
Tool cost - amateur POF	see matrix 3
Maintenance required (describe)	Wipe endface with lint free cloth / No
Maintenance advised (describe)	Wipe endface with lint free cloth / cleaning (fiber end alignment hole)
Protection from dust etc (describe)	Dust covers included in conn. kit / cap

Note: AMP has some of the cost information requested. However, discussion of specific cost information must be deferred to the AMP Legal Department, namely Jim Gibson (717-592-4769, email jmgibson@amp.com).

F07/PN Comparison Matrix - 2

	F07/PN
Duplex, asymmetric, differentiated (keying etc)	Yes / Yes
Support speeds from 125 MBaud up to 4GBaud	No (TBD from device mfrs) / TBD
Suitable for equipment, dongles and wall plates	Yes / Yes
Enables user-assembled patch cords (NB NOT a requirement)	Yes / Yes
Size compared with RJ45	2X / No
Worst-case loss (dB)	2.0 dB / 2 dB
Optical performance complies to TIA 568 requirements	? / ?
Suitable for MMF	Yes- 200/230um HCS / Yes (TBD)
Suitable for POF	Yes- 1000um plastic / Yes
Eye safety issues	? / No lid
Physical safety issues	No / ?

F07/PN Comparison Matrix - 3

	F07/PN
Tooling estimated costs GOF professional	/ see note
Tooling estimated costs POF professional	See note. Cost is for a professional installers kit. Includes ALL tooling and microscope / see note
Tooling estimated costs GOF amateur	/ see note
Tooling estimated costs POF amateur	See note. Cost is for a standard termination kit. Includes ONLY necessary FO7 tools and no microscope / see note
What is available for GOF	Conns for 200/230um HCS style fibers /
What is available for POF	Conns for 1000um POF. Transceivers (currently at 10Mb/s) / plug, adaptor TRX (S100)
What is under development for GOF	/ nothing
What is under development for POF	/ TRX(S200)
performance after 500 cycles	2.5dB max / TBD
performance after 1500 cycles	not rated / questionable
independent testing (including round robin) info	Connectors tested internally to AMP / not yet
number of vendors of the proposed connector	At least 3 companies offer the FO7 / more than 3
transceiver integration information	? / S100 available, S200 developing

Note: AMP has some of the cost information requested. However, discussion of specific cost information must be deferred to the AMP Legal Department, namely Jim Gibson (717-592-4769, email jmgibson@amp.com).

Direct Comparison Matrix - 1

	Direct
Mechanical Spec reference	T R -41, P E N D I N G
Patent letter filed with IEEE	Y E S - S E E ATTAC HE D
System cost compared to UTP-5	P O F = G O F +50%
Connector cost compared to RJ-45	
Cost per optical port	P O F +25% G O F +25%
Cable assemblies cost c/f UTP-5	P O F -25% G O F +50%
20 yr lifetime	Y E S
Installation cable termination complexity (describe)	8 A S S E M B L Y S T E P S - S E E ATTAC HE D
Tool cost - professional GOF	S A M E A S S T / S C P E R T I A - 568
Tool cost - amateur GOF	35% O F S T / S C S T A N D A R D K I T
Tool cost - professional POF	= S A M E A S R J -45 M O D P L U G P E R T I A -568
Tool cost - amateur POF	35% O F R J -45 M O D U L A R P L U G
Maintenance required (describe)	N O R E G U L A R M A I N T E N A N C E R E Q U I R E D
Maintenance advised (describe)	C L E A N F I B E R E N D S W I T H A L C O H O L
Protection from dust etc (describe)	N O T R E Q U I R E D

Direct Comparison Matrix - 2

	Direct
Duplex, asymmetric, differentiated (keying etc)	YES
Support speeds from 125 MBaud up to 4GBaud	YES - SEE ATTACHED SCHEDULE
Suitable for equipment, dongles and wall plates	YES
Enables user-assembled patch cords (NB NOT a requirement)	YES
Size compared with RJ45	= SAME IDENTICAL FOOTPRINT
Worst-case loss (dB)	POF 2.0dB GOF TBD
Optical performance complies to TIA 568 requirements	?POF YES (ATM FORUM) GOF TBD
Suitable for MMF	YES - 50/125 OR 62.5/125
Suitable for POF	YES - SI POF OR GRIN POF
Eye safety issues	INTEGRAL EYE SAFETY IN NORMAL USE
Physical safety issues	NO EXPOSED FIBERS IN NORMAL USE

Direct Comparison Matrix - 3

	Direct
Tooling estimated costs GOF professional	= SAME AS TYPICAL ST/SC
Tooling estimated costs POF professional	= SAME AS RJ-45 MODULAR PLUG
Tooling estimated costs GOF amateur	35% OF TYPICAL ST/SC
Tooling estimated costs POF amateur	35% OF TYPICAL RJ-45 MODULAR PLUG
What is available for GOF	
What is available for POF	S200 NOW,
What is under development for GOF	Jack and Plug - MAR '98
What is under development for POF	S400 MAR '98 S800/3200 TBD
performance after 500 cycles	TBD
performance after 1500 cycles	TBD
independent testing (including round robin) info	PENDING
number of vendors of the proposed connector	3 OTHERS PENDING
transceiver integration information	S200 NOW, S400 MAR '98, S800/3200 TBD

VF-45 Comparison Matrix - 1

	VF-45
Mechanical Spec reference	PN-3968, FO-6.3, FOCIS 7 PN-4122 (TIA 47500AC)
Patent letter filed with IEEE	IEEE in process (filed with ANSI)
System cost compared to UTP-5	Approxiamte cost per line compared to UTP-5 is 1.48X, the cost per line is made under the following assupmtions with items listed: duplex cable, 1 jack, % of loaded patch panel, wall plate, and 2 patch cables
Connector cost compared to RJ-45	The price of the VF-45 connector socket is approximately the same price compared to a RJ-45 CAT-5 Jack.
Cost per optical port	The cost of a VF-45 plug(cable assembly) and socket is approximately the same as a RJ-45 modular jack and RJ-45 cable assembly combined. So, cost per port is comparable to an RJ45. The VF-45 cost is based with a duplex fiber designed used with this connector.
Cable assemblies cost c/f UTP-5	The price of a VF-45 cable assembly is 1.85X higher than the cost of an RJ-45 cable assembly. The VF-45 is duplex fiber and two plugs. NOTE: A VF-45 cable assembly consists of two plugs with duplex fibers.
20 yr lifetime	Yes, using glass optical fiber. The VF-45 is made of molded plastic pieces designed for durability and long life.
Installation cable termination complexity (describe)	Installation of the VF-45 is comparable to an 8 pin RJ-45 modular jack. Less than 2 minutes installation time. The VF-45 is made of injection molded parts, user friendly, ferrule-less design, automated manufacturing process and a simple 3 piece snap together design.
Tool cost - professional GOF	Approximately 1/3rd of the cost of a standard field termination fiber tool kit.
Tool cost - amateur GOF	Target price will around \$20 to \$30.
Tool cost - professional POF	N/A
Tool cost - amateur POF	N/A
Maintenance required (describe)	Minimal cleaning. The VF-45 uses a solution desinged to clean circuit boards. The solution is called HFE and is non conductive, non toxic and non flammable. To use simply spary into VF-45 and solution will clean fibers and evaporate with in 5 seconds.
Maintenance advised (describe)	Use HFE solution to clean.
Protection from dust etc (describe)	Spring loaded door for VF-45 socket and slide door for VF-45 plug.

VF-45 Comparison Matrix - 2

	VF-45
Duplex, asymmetric, differentiated (keying etc)	The VF-45 only inserts one way, designed with RJ-45 latch.
Support speeds from 125 MBaud up to 4GBaud	YES, using glass optical fiber.
Suitable for equipment, dongles and wall plates	Yes
Enables user-assembled patch cords (NB NOT a requirement)	Yes
Size compared with RJ45	VF-45 is comparable to RJ45.
Worst-case loss (dB)	Typical loss 0.5dB, but less than 0.75dB.
Optical performance complies to TIA 568 requirements	YES, also IEC.
Suitable for MMF	YES, 50 micron and 62.5 micron.
Suitable for POF	no
Eye safety issues	Spring loaded door for VF-45 socket and slide door for VF-45 plug.
Physical safety issues	Bare fiber handling is minimized during installation with polishing puck, slide doors on plug and socket and common tools are used during installation for familiarity.

VF-45 Comparison Matrix - 3

	VF-45
Tooling estimated costs GOF professional	similar to the above tool cost
Tooling estimated costs POF professional	
Tooling estimated costs GOF amateur	similar to the above tool cost
Tooling estimated costs POF amateur	
What is available for GOF	Professional tool kit and VF-45 socket and plug assembly, media converters, transceiver, patch panels, wall plates, network electronics with VF-45 and test equipment.
What is available for POF	N/A
What is under development for GOF	Amateur tool kit.
What is under development for POF	N/A
performance after 500 cycles	Less than 0.3dB change
performance after 1500 cycles	Less than 0.3dB change
independent testing (including round robin) info	Beta trials in use and installed by local contractors. Beta's in USA, Europe and Japan.
number of vendors of the proposed connector	3M and several Licensees in process
transceiver integration information	10Mbps, 4/16Mbps, 100Mbps & Gigabit. Licensing per ANSI requirements to ensure that networking vendors have products from multiple vendors. Transceiver is being incorporated in switched, HUB's and NIC's by multiple vendors. Transceiver VF-45 desing will be available under various protocols

LC Comparison Matrix - 1

	LC
Mechanical Spec reference	We have submitted to TIA FO6.3 FOCIS (work item approved) and IEC 86B WG6 (Submission approved by USTAG)
Patent letter filed with IEEE	In process of filing letter with the IEEE.
System cost compared to UTP-5	1.2X to 1.5X for system consisting of connectors, patchcords, panels, outlets and cable.
Connector cost compared to RJ-45	2X
Cost per optical port	1.25X
Cable assemblies cost c/f UTP-5	1.5X
20 yr lifetime	YES
Installation cable termination complexity (describe)	Easy to mount. The LC connector is installed the same as a SC or ST connector, except quicker due to the smaller size. The installer may choose from the following mounting methods - epoxy, EZ method, and crimp on (future offering). The installation time takes from 2 minutes to 5 minutes depending on the method chosen. Only simple hand tools are required.
Tool cost - professional GOF	Tools cost the same as the SC and ST.
Tool cost - amateur GOF	Tools cost the same as the SC and ST. Possible low cost tooling for use by amateur if volume appropriate.
Tool cost - professional POF	Similar to UTP tooling costs
Tool cost - amateur POF	Similar to UTP tooling costs.
Maintenance required (describe)	Same as SC and ST.
Maintenance advised (describe)	Clean before making a connection.
Protection from dust etc (describe)	A protective cap is provided on the connector and adapter.

LC Comparison Matrix - 2

	LC
Duplex, asymmetric, differentiated (keying etc)	Yes
Support speeds from 125 MBaud up to 4GBaud	Yes
Suitable for equipment, dongles and wall plates	Yes
Enables user-assembled patch cords (NB NOT a requirement)	Yes
Size compared with RJ45	Smaller than RJ45 but with mounting collar can be mounted in the same cut out as an
Worst-case loss (dB)	max 0.4dB average 0.10 dB
Optical performance complies to TIA 568 requirements	YES, also IEC and Bellcore
Suitable for MMF	Yes, and single mode
Suitable for POF	With some design work, the LC could become a POF connector, preliminary design work done
Eye safety issues	None from a laser stand point. However, as always safety glasses are recommended when installing the connector on fiber.
Physical safety issues	UL-94, Bellcore GR-326

LC Comparison Matrix - 3

	LC
Tooling estimated costs GOF professional	same as ST & SC
Tooling estimated costs POF professional	Similar to UTP tooling costs
Tooling estimated costs GOF amateur	lowcost tooling possible
Tooling estimated costs POF amateur	Similar to UTP tooling costs
What is available for GOF	Field mountable connector, duplex adapter (both standard height and low profile), patch cords, hybrid patch cords, panels, mounting collar for RJ45 cutout, tool kit, consumable kit and upgrade kit
What is available for POF	No POF products at this time.
What is under development for GOF	Many products are underdevelopment to finish out the LC product family such as attenuators, simplex adapters, among other products.
What is under development for POF	Preliminary work has been done on POF LC connector.
performance after 500 cycles	Product has been tested to 500 matings without failures (<0.2dB change)
performance after 1500 cycles	Product has been tested to 1000 matings without failures (<0.2 dB change)
independent testing (including round robin) info	5 Beta Test sites, over 50,000 installed connectors. Lucent has completed a significant amount of internal testing.
number of vendors of the proposed connector	One (1) today, with the potential of four (4) by the end of the year.
transceiver integration information	LC Front End drawings available now. Several companies are considering manufacturing an LC transceiver. More information should be available by the end of the year Lucent is committed to having an end to end LC solution.

Mini-MT Comparison Matrix - 1

	Mini-MT
Mechanical Spec reference	TIA PN- 4107; IEC NWIP accepted
Patent letter filed with IEEE	No, but willing
System cost compared to UTP-5	2-3X
Connector cost compared to RJ-45	see note
Cost per optical port	see note
Cable assemblies cost c/f UTP-5	equal (POF)
20 yr lifetime	TBD
Installation cable termination complexity (describe)	Will be easy
Tool cost - professional GOF	vendor dependent
Tool cost - amateur GOF	vendor dependent
Tool cost - professional POF	N/A
Tool cost - amateur POF	N/A
Maintenance required (describe)	Cleaning
Maintenance advised (describe)	N/A
Protection from dust etc (describe)	Standard covers

Note: AMP has some of the cost information requested. However, discussion of specific cost information must be deferred to the AMP Legal Department, namely Jim Gibson (717-592-4769, email jmgibson@amp.com).

Mini-MT Comparison Matrix - 2

	Mini-MT
Duplex, asymmetric, differentiated (keying etc)	Yes
Support speeds from 125 MBaud up to 4GBaud	Yes
Suitable for equipment, dongles and wall plates	Yes
Enables user-assembled patch cords (NB NOT a requirement)	No
Size compared with RJ45	Smaller
Worst-case loss (dB)	.75dB
Optical performance complies to TIA 568 requirements	
Suitable for MMF	Yes
Suitable for POF	No
Eye safety issues	None
Physical safety issues	None

Mini-MT Comparison Matrix - 3

	Mini-MT
Tooling estimated costs GOF professional	Vendor dependent
Tooling estimated costs POF professional	Vendor dependent
Tooling estimated costs GOF amateur	Vendor dependent
Tooling estimated costs POF amateur	Vendor dependent
What is available for GOF	
What is available for POF	N/A
What is under development for GOF	
What is under development for POF	
performance after 500 cycles	
performance after 1500 cycles	
independent testing (including round robin) info	
number of vendors of the proposed connector	5
transceiver integration information	Yes