

FTTH HOME PASS INSTALLATION GUIDE

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Access Network Projects Section

Document Control Sheet

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1. STANDARDIZED MATERIAL LIST

1.1. Fiber Termination Cabinet

	Supplier	Manufacturer	Model
1	Luminex (Pvt) Ltd	Jiangsu zhongtain technology Co Ltd	600 Ground- GXF-600D
			300 Ground- GXF-300D
			160 Ground- GXF-160D
			90 Ground- GXF-90D
			128 wall- GF01-BJ128D
			64 wall- GF01-BJ64D
			16 wall- GF01-BJ16D
			8 Pole- GF03-8D
			20 Pole- GF01-20D
			30 Pole- GXF-30D
			60 Pole- GXF-60D
			90 Pole- GXF-90D
2	C & D International (Pvt) Ltd	C & D International (Pvt) Ltd	600 Ground-CD-FTC-600-OG
			300 Ground-CD-FTC-300-OG
			160 Ground-CD-FTC-160-OG
			90 Ground-CD-FTC-090-OG
			128 wall-CD-FTC-128-IW
			64 wall- CD-FTC-064-IW
			16 wall- CD-FTC-016-IW
			8 Pole- CD-FTC-008-OP
			20 Pole- CD-FTC-020-OP
			30 Pole- CD-FTC-030-OP
			60 Pole- CD-FTC-060-OP
			90 Pole- CD-FTC-090-OP


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1.2. Fiber Distribution Point

	Supplier Name	Manufacturer	Brand Name/Model
1	Luminex (Pvt) Ltd	Jiangsu zhongtain technology Co Ltd	ZTT-GF03-8D
2	Luminex (Pvt) Ltd	Jiangsu zhongtain technology Co Ltd	ZTT-1311 only at end point
3	Cybertec Enterprises (pvt) Ltd	Shanghai Grandway	Cyberlink/SP/1606/24A
4	Three-OPP Lanka (Pvt) Ltd	Three OPP(M) SDN BHD, Malaysia	3 OPP
5	Sashira International	Shenzhen Allopto Limited	ALLOPTO FDB G-24A (SAGA)
6	Sashira International	Shenzhen Allopto Limited	ALLOPTO FDB G-16C (SAGA)
7	Sashira International	Shenzhen Allopto Limited	ALLOPTO ODF-PLCOW 2 16SC (SAGA)
8	Siyol Interntional (Pvt) Ltd	Shanghai Tangpin Technology Co Pvt Ltd	Tangpin TP1319-8B (Only at end point)
9	Upeka Trading Company	SFO Technologies (Pvt) Ltd, India	SFO
10	Sanergy (Pvt) Ltd	SunseaTelecom Co Ltd	SUNSEA
11	Aiken Pvt Ltd	Hengton optic - Electric Co Ltd, China	Heng Tong
12	Hyperjet Technologies (Pvt) Ltd	Zhejiang Chaoquan Telecommunication Technologies Co Ltd,	Chaoqian GXF6-15N6S5-8F (16 PORT)
13	Hyperjet Technologies (Pvt) Ltd	Henan Shijia Photons Technology Co Ltd	Shijia 16 port -1
14	Leadlanka	Hang Xhou Xingfa Technology Co Ltd	LTTS/SKYNET

1.3. Optical Splitter


	Supplier Name	Manufacturer	Brand Name/Model
1	Luminex (Pvt) Ltd	Jiangsu zhongtain technology Co Ltd	ZTT /PLC-01
2	Upeka Trading Company Pvt Ltd	SFO Technologies	PLC-01
3	Hyperjet Technologies (Pvt) Ltd	Henan Shijia Photons Technology Co Ltd	Shijia /plc 01

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4	Sashira International	Shenzhen Allopto Limited	SAGA
5	Three-OPP Lanka (Pvt) Ltd	3D link	3D Link /ABS TYPE -1
6	Cybertec Enterprises (pvt) Ltd	Shanghai Grandway	Shanghai Grandway /Micro type
7	Aiken Pvt Ltd	Hengton optic - Electric Co Ltd, China	HENGTONG Micro Type-1
8	Sanergy (Pvt) Ltd	SunseaTelecom Co Ltd	SUNSEA /PLC01
9	Intel (Pvt) Ltd		NINGBO -gmf/PLC 01
10	C&D International (Pvt) Ltd	Tafcom	Tafcom/PLC Type

1.4. Civil Material

No	Material Name	Standardized Supplier list
1	Poles	NES Constructions
		AGGA Steel
		P&C Constructions
		Industrial Concrete Works
		JD Constructions
		Sierra Construction (pvt) Ltd
		Browns Engineering
		Comtec Systems (pvt) Ltd
		Treble D Enterprises
		Access Engineering Ltd
		Jayani Constructions
		Pathma Constructions
		USS Engineering
		S L Construction & Builders (pvt) Ltd
2	Pole Brackets	Dilushan Iron Works
	C-Hooks	Thilaka Traders & Engineering, Dilushan Iron Works, USS Engineering, Teshan Engineering, Trio Trade & Transport Ltd
	L-Hooks	Thilaka Traders & Engineering, Dilushan Iron Works, USS Engineering, Teshan Engineering, Trio Trade & Transport Ltd
	Stay Wire	Trio Trade & Transport
	Stay Set	Premasiri Enterprise
3	PVC Pipes & Accs.	National PVC, Phoenix Industries Ltd.
4	Retainers	Yashiba Trading Company Pvt Ltd.
5	Cable Ties	Rotax Limited
6	CAT5 Cables	Kelani Cables
7	Internal Wire	Kelani Cables

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8	Earth Wire	Sierra Cables
9	Cable Grippers	Nics (Pvt Ltd.
10	S/S Band, Buckle, Holders	Dilushan Iron Works
11	Drop Wire Connectors	Sashira International Pvt. Ltd
12	UY Connectors	
13	Hand Holes	Industrial Concrete Works
14	Frame & Covers	Edna Engineering (Pvt.) Ltd.
15	Cable Trunking	Polychrome Cable Management System Pvt. Ltd.

2. NETWORK INSTALLATION STANDARDS


2.1. Fiber Termination Cabinet

GROUND MOUNT INSTALLATION

- Fix primary (incoming UG) cable to the gland which is located at the bottom of the cabinet.
- Route primary (incoming) fiber tubes into relevant fiber panels through fiber tube guiding tray.
- Connect the Fiber to the SC/UPC adapter According to the network requirement. Take Fiber through the cable management part.
- Connect the fibers by splicing and coil the cable in the cable management part.
- Splice the primary and secondary cable with pigtails inside the tray
- Place the spliced fiber with sleeve at the Splicing tray.
- Install the splitter inside the splitter tray
- Take the secondary fiber cable through outlet from the cabinet and take it through the riser (for UG cable) or to the pole. (Ariel cable)
- Connect the earth wire to the earthling Point Of the cabinet
- Earth measurement must be less than 50 ohms (Ω)
- The height of the base shall be at least 450mm above the exiting ground level.
- Keep 10m coil inside the MH
- Do Labeling as per SLT standard

POLE MOUNT INSTALLATION

- Mount the FTC in 8m SLT standard pole
- FTC should mount at the height of 3.0m from ground or 1.5m from ground (depending on the site situation)

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- Keep the 7.5 m primary cable coil at pole or nearest MH
- Fix and route the primary (incoming) cable and Secondary (outgoing) cables to the gland which is located at the bottom of the cabinet.
- Install the splitter inside the splitter tray
- Incoming fiber to be terminated with Splitter input by splicing and coil the cable in the trays.
- Splitter output pigtails should connected to E-Side of the patch panel with SC/UPC adapters
- Terminate the secondary cable by Splicing with pigtails inside the splicing tray
- Pigtails (Secondary cable) to be connected matching the Patch panel port & FDP number to D-Side of the Patch panel with SC/UPC adapter
- Do the cable arrangement in proper way using cable management and labeling
- Connect the earth wire to the earthling point of the cabinet
- Earth measurement must be less than 50 Ohms for FTC
- Do Labeling as per SLT standard

TERMINATING SECONDARY CABLES IN FTC

- All secondary cables (as in the approved plan) to be terminated in FTC in the inner side of cable tray.
- If an alternative cable (larger in size) is used at implementation instead of the designed cable type, only the number of cores in the approved design to be terminated in FTC (E.g., due to unavailability of required cable type).
- Fiber cores to be terminated in the core order and all the cores which are not connected to FDPs to be considered as stumps or spare cores.
- A FDP Number to be allocated and reserved for all of such stumps
- Do Labeling as per SLT standard

TERMINATING PRIMARY CABLES IN FTC

- In the case of primary cables
 - Only required number of cores are released at FTC (as per approved design) and the rest is passed though (Case a)
 - Or a cable tail tapped from an existing steam ends up at FTC (Case b)
- Fiber cores are arranged within FTC as follows
 - In the case-a, only the required cores are spliced to Splitter inputs (as per the approved design) and the balance reserved cores (in the same tube) remain not spliced or not terminated within management tray of FTC; the rest of the tubes to be passed through

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- In the case-b, only the required cores are spliced to Splitter inputs (as per the approved design) and the balance cores remain not spliced or not terminated within management tray of FTC
- Do Labeling as per SLT standard

EARTH SHEATH (ALUMINUM FOIL) OF AERIAL/CONDUIT CABLE


- Earth Sheath of Conduit/Aerial cable to be grounded only at the following locations
 - At ODF (cables beginning at ODF D side)
 - At Local ODF of FTC (cables ending at ODF E side and cables beginning at ODF D side)
- Earth Sheath of Conduit/Aerial cable not to be continued/bonded at any joint or FDP
- Earth Sheath not to be continued/bonded within aerial/underground Joint Closure
- Earth Sheath not to be continued/bonded within FDP

IMPORTANT POINTS TO CONSIDER DURING PRIMARY CABLE WORK

- Rack inside the exchange
- Cable termination and cable arrangements
- Cable Tags
- Splicing arrangements inside the Trays
- Core arrangement of each tray
- Grounding of both sides (Rack and Common Earthing bar)
- Full view of Front and back sides of Rack
- ODF anchor bolt photos
- Cable laying inside the Exchange (Vertical and Horizontal racks)
- Cable tag photos inside the exchange
- OTDR test report for core category

2.2. Fiber Distribution Point

- FDP should mount 3.5m from ground level (reference bottom of FDP)
- FDP Pole size – 6.7m,7.5m, but crossing 8m
- 8m height poles will be installed only at places, where required ground clearance cannot be maintained with existing poles. 8m poles will not be installed replacing existing poles at FDPs, if existing pole is suitable for FDP installation.
- Fiber Coil length at Mid - FDPs total 15m at both sides 7.5m (enabling to lower the areal cable to ground)
- Fiber coil length at stump is 20m


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- At the End- FDP keep secondary cable coil length of 7.5m
- Route and fix the secondary (incoming) cable to the gland which is located at the bottom of the FDP
- Install the splitter inside the splitter tray
- Incoming fiber to be terminated with Splitter input by Splicing and coil the cable in the trays
- Splitter output connected to SC /UPC Adapters
- Do Labeling as per SLT standard

2.3. Civil work

POLE ERECTION AND CABLE DRAWING

- Follow the standards considering below points during pole erection
 - Buried depth
 - Concrete based on soil type
 - Pole number
 - Check Top bolt
 - Use proper bracket
 - Coils Tie ropes
 - Guy cable
- Construction of poles with struts and stays wherever those required
- Buried depth of the pole: 1/5th of the actual height of pole
- The alternation method could be adept for installation of concrete pole in case of following.
 - When the rock appears from surface of ground level to the bottom.
 - When the rock or Kabock hard soil appears middle of buried depth.
- Buried depth to be measured using the pole Height Measuring Instrument
- Permissible Cable Clearance (Along the Road – 4.5m and at Road Crossings – 5.0m & ensure Properly Tensioned Power Crossing as indicated below
 - <600V – 60cm,
 - 600 - 700V - 120cm
 - 7000V – 15000V - 200cm
- Sag of Cable not to exceed 0.4m for 40m or less pole span, sag of 0.7m between 40-50m pole span.
- Cable clearance from foliage must be not less than 1m
- If the pole contains closure joints total 20m cable coil must be keep, both side 10m cable coil
- If a cable laying more than 500m, cable coil of 20m must be kept at each 500m distance

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- Coils must tie up with UV protected tie rope at least 3 points and neatly arranged
- Existing pole – Check pole defects / Check Pole straightness / Proper distance between CDP & FDP
- 8m height poles will be installed only at places, where required ground clearance cannot be maintained with existing poles. 8m poles will not be installed replacing existing poles at FDPs, if existing pole is suitable for FDP installation.


INSTALLATION PROCEDURE OF HEIGHT EQUAL TO "h" POLE.

1. Required Depth is 0.2h

Height of the pole(m)	Standard depth (1/5) (m)	Tolerance +/- (15%)
5.5	1.1	0.93
6.7	1.34	1.13
7.3	1.46	1.24
8.0	1.60	1.36
9.0	1.8	1.53

Pole concreting – SLT Standards to be followed

	Possible reaching Depth (meters)/(Feet's)	Lost Depth	Countermeasure
A	0.2h	0	
B	$0.2h > D > 0.17h$	0 - 0.03h	Acceptable (Only under inspection)
C	$0.17h > D > 0.12h$	0.03h - 0.08h	0.1h depth should concrete from the bottom of the pole. (Consider reinforcement depending on the soil condition)
D	$0.12h > D > 0.06h$	0.08h - 0.14h	0.10h long four no: mild steel drill and insert to the rock to 0.05h depths, and 0.1h depth should concrete from bottom of the pole
E	$0.06h > D > 0.0h$	0.14h - 0.2h	0.15h long four no: mild steel drill and insert to the rock to 0.075h depths, and 0.1h depth should concrete from bottom of the Pole.


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AERIAL CABLE GUARD WIRE

- Guard wire of aerial cable not to be grounded at each FDP
- Aerial cable guard wire to be grounded only at the following locations
 - At the beginning of aerial cable
 - At the end of aerial cable
 - If an aerial cable is branched, the guard wires of each branch to be grounded at their ends.
- Guard wire of aerial cable to be continued by bonding
 - Guard wires to be bonded to ensure electrical continuity throughout at each cable jointing/breaking points

IMPORTANT POINTS TO CONSIDER DURING CIVIL WORK

- Repair of existing PVC conduit
- Ground mount FTC base
- Guy/ Strut installation
- New Riser Pipe - New pole / Riser Pipe / Proper Sealing / Photos
- New pole installation
- Pole resetting
- Adjustment of MH/HH cover and frame
- Pipe laying and trenching
- Pole concrete (If pole can't be buried up to standard depth)
- PVC conduit with slab protection
- PVC conduit with concrete encasement
- Removal and relocation of existing concrete pole
- Installation of grounding and bonding
- Trench excavation depth, width, length etc.:
- Depth of the pole hole, when a Pole erecting on a hard rock/Soil if Pole Con. Needed

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2.4. Labeling

LABELING FORMAT

- Font: **Cambria**
- Font size: **14**
- Make the text **BOLD**
- All text: **Capital**
- Text color: **Black**
- Background of label: **White**
- Text should be **left aligned**
- Create inner box: **Each side 5mm from text**

CEN-WTC-0501-015

- Maximum length of inner box: **6cm**

CEN-WTC- XYZ - 501-015

- Create outer box: **Each side 3~4 mm from inner box**
- Between inner and outer box space color: **black**

CEN-WTC-501-015

- Label should laminate - 1.0 cm length to have from left side of outer box

CEN-WTC-501-015


- Width of the inner box may vary based on number of lines

- **Line space 1.5** for multi-line label

**CEN-WTC-00001-A-OPT E-
2: 1=> 16**

- Tie the Label with cable using tie rope

Note: Some location not possible to tie the label in laminated format, please use the reliable sticker for labeling

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LABELING-INSIDE EXCHANGE ROOM

- **OLT labeling**

Check the labeling in the Patch cord connected to OLT GPON port end

GPON Vendor Index No/ SHELF No/CARD No/Port No.
ODF RACK No/SHELF No/ODF Capacity/Connected ODF Port
FTC/Splitter Number

Example:

GPON N01/01/01/08
ODF RACK 01/Shelf 02/96(28)
AKP-PKP-0554/S01

(Remarks- for Vendor names, **Huawei-H, ZTE-Z, Nokia-N**)

- **ODF in labeling**

Check the labeling in the Patch cord connected to ODF inside port

ODF RACK No/SHELF No/ODF Capacity/Connected ODF Port
GPON Vendor Index No/ SHELF No/CARD No/Port No.
FTC/Splitter Number

Example:

ODF RACK 01/Shelf 02/96(28)
GPON N01/01/01/08
AKP-PKP-0554/S01


- **ODF out labeling:**

- Check the ODF out port which is terminated primary cable

LEA - Cable Code- OPT: 1 =>Cable Size (Primary Cable)

Example:

AKP-A-OPT: 1=>96(Primary Cable)

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FIBER DISTRIBUTION CABINET

- Following information need to observe/get from OLT and ODF during FTC QC
 - LEA name (Connected OLT LEA)
 - Suburb code (provided by SLT regional Team)
 - FTC number (Not duplicate within LEA)
 - Connected ODF Rack/Shelf/Port number
 - Need to have updated Cable drawing and Splitter diagram.
 - Cable arrangement neatness at FTC
 - Proper Duct sealing of FTC Incoming, Outgoing cables inlets
 - FTC Height – 3m / 1.5m (Depends on regional requirements and directions)
 - Fiber core arrangement and Splitter arrangement inside the trays
 - Fiber Pigtail arrangement
 - Proper mounting to Pole/FTC base
 - All Labeling inside FTC

• **FTC name**

LEA-SUB CODE-FTC NO

Example:

AKP-PKP-0554

• **FTC primary incoming**

FTC name- OPT E-1: 1=> Cable Size (Incoming Cable) (Primary cable)


Example:

AKP-PKP-0554-OPT E-1: 1=>4(incoming cable) (Primary Cable)

• **FTC splitter name**

S (Splitter Number):1X8

Note: Labeling order- Bottom to top/Left to right

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Example:

S01:1x8

- **FTC splitter input core**

ODF - RACK No. | SHELF No. | ODF Capacity (Connected ODF Port) Splitter Name.

Note: Labeling order- Bottom to top/Left to right

Example:

ODF RACK 01/Shelf 02/96(28) S01

- **FTC splitter output core**

(Splitter No.) – (Port No.) / (FDP No.)

Note: Labeling order- Bottom to top/Left to right

Example:

S01-P01/FDP-001

- **Secondary core out connected to FTC splitter**

FDP- (Connected FDP Number)

Example:


FDP-001

- **Secondary cable out**

FTC Name – Cable Code – OPT: 1=> 8 (Cable size) (Outgoing Cable) / Cabinet Number / Connected FDPs

Example:

**AKP-PKP-0554-A-OPT: 1=>8
(Outgoing cable)/554/ (001 to 005)**

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Secondary cable stump

- Labeling FTC port for future use based on the diagram.

FDP Number/Stump

Example:

FDP001/Stump

FIBER DISTRIBUTION POINT

- FDP name

LEA – Sub-Code – FTC no – FDP No.

Example:

AKP-PKP-0554-001

- FDP splitter

S (FDP No.): 1X8

Example:

S01:1x8

- FDP secondary cable in

LEA – Sub-Code – Cabinet No.-Cable code-OPT E-1 (Cable size) (Incoming Cable) / Cabinet No. / Connected FDP Nos.

Example:

**AKP-PKP-0554-A-OPT E-1: 1=>4
(Incoming cable)/554/ (001 to 003)**

- FDP splitter input

FTC Splitter No, - Splitter Port No.

Example:


S01-P01

- FDP secondary cable out for mid span FDP

FTC Name-Cable code-OPT E-1 (Cable size) (Outgoing Cable) / Cabinet No. / FDP Range

Example:

**AKP-PKP-0554-B-OPT E-1: 1=>4
(Outgoing cable)/554/ (007,006)**

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EXISTING JOINT

- Closure in
LEA - Cable Code- OPT E-1: 1 =>Cable Size (incoming Cable)
Example:

AKP-A-OPT E-1: 1=>96(incoming cable)

- Closure out (for first cable)
LEA - Cable Code- OPT E-1: 1 =>Cable Size (outgoing Cable)

AKP-A-OPT E-1: 1=>64(outgoing cable)

- Closure out (for second cable)
LEA - Cable Code- OPT E-2: 1 =>Cable Size (outgoing Cable)

AKP-A-OPT E-2: 1=>32(outgoing cable)


LIVE JOINT

- Closure in
LEA - Cable Code- OPT E-1: 1 =>Cable Size (incoming Cable)
Example:

AKP-A-OPT E-1: 1=>64(incoming cable)

- Closure out
FTC Name- Cable Code- OPT E-1: 1 =>Cable Size (outgoing Cable) (Primary Cable)

AKP-PKP-0554-A-OPT E-1: 1=>4(outgoing cable) (Primary cable)

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SECONDARY CABLE JOINT

- Closure in

**FTC Name - Cable Code- OPT E-1: 1 =>Cable Size (incoming Cable)/FTC no/
Connected FDP Range**

Example:

AKP-PKP-0554-A-OPT E-1: 1=>4 (incoming cable)/554/ (001 to 003)

- Closure out (first cable)

**FTC Name- Cable Code- OPT E-1-1: 1 =>Cable Size (outgoing Cable)/FTC Number/
Connected FDP range**

Example:


AKP-PKP-0554-A-OPT E-1-1: 1=>4(outgoing cable)/554/(002 to 003)

- Closure out (second cable)

**FTC Name- Cable Code- OPT E-1-2: 1 =>Cable Size (outgoing Cable)/FTC Number/
Connected FDP range**

Example:

AKP-PKP-0554-A-OPT E-1-2: 1=>4(outgoing cable)/554/(001)


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FTC CARD

FTC Card		FTC Name:		FTC-GPS Reading		FTC Address	
Incoming Fibre No.	Splitter No.	Splitter Type	Outgoing Fibre No.	Power Loss (dB)	FDP Number	FDP-GPS Reading	FDP Address/Floor No
	1		1				
			2				
			3				
			4				
			5				
			6				
			7				
			8				
	2		1				
			2				
			3				
			4				
			5				
			6				
			7				
			8				
	3		1				
			2				
			3				
			4				
			5				
			6				
			7				
			8				
Contractor							
Other							

FDP CARD

FDP Card					
FDP No	- - -	FDP Address		FDP-GPS Coordinates	
Splitter Port	Phone No	Power (dB)	Home Address	Other Contact	
1					
2					
3					
4					
5					
6					
7					
8					
Contractor					
Other					

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3. TOOLS AND ACCESSORIES

3.1. Mandatory tools

Cabling Team

- Guy Cutter
- Cutter Knife
- Long Nose Plier
- Combination Plier
- Side Cutter
- Spanner 10"
- Tool Box
- Combination Spanners 18mm- 22mm
- Man-hole Key
- Cable Pulley
- Cable Ratchet
- SS Band Cutter
- Jack Set
- Running Ladders (12*2)
- Measuring Wheel
- Warning Board
- Emergency light
- Angle Knife
- Heavy Knife
- Safety Jacket
- Safety Helmet
- Safety Belt
- Safety Shoes
- Safety Boots

Splicing Team


- Tool Box
- T-Wrench (11mm)
- SS Band Cutter
- Running Ladders (10*2)
- Plastic Chair
- Plastic Stool
- Garden Umbrella
- Mid-span Tool
- VFL
- Tube Cutter
- Splicing Machine
- Cleaver
- Stripper
- Power Meter
- Power Source
- Safety Belt
- Safety Jacket
- Safety Helmet
- Safety Belt
- Safety Shoes
- Safety Boots
- Warning Board

PAT Team

- Mobile Phone
- Running Ladders (10*2)
- Power Meter
- Power Source
- Measuring Wheel
- Safety Jacket
- Safety Helmet
- Safety Belt
- Safety Shoes
- Safety Boots

3.2. General tools


- Claw Hammer (0.25kg, 0.5kg)
- Sledge Hammer (4Lb, 14 Lb)
- Guy Cutter
- Cutter Knife
- Long Nose Plier
- Combination Plier
- Side Cutter
- Rivet Gun
- Spanner (8", 10")
- Box spanner Handle
- Box spanner Ratchet
- Palm Saw
- Hacksaw Frame
- Mamoty
- Tool Box

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- Combination Spanner 6mm-24mm
- T-Wrench (11mm, 12mm)
- Trowel
- Double Shovel
- Shovel
- Crow Bar
- Chisel
- Man hole Key
- Cable Pulley
- Cable Ratchet
- Screw Drivers 4, 5, 6, 12" +
- Screw Drivers 4, 5, 6, 12" -
- SS Band Cutter
- Jack Set
- Angle Knife
- Heavy Knife
- Running Ladders (10*2)
- Running Ladders (12*2)
- Step Ladders (5'')
- Plastic Chair
- Plastic Stool
- Garden Umbrella
- Pad Lock
- Midspan Tool
- VFL
- Tube Cutter
- Drop Tool
- Drop Cable Stripper
- Three Hole Stripper
- Hilty bit (6mm, 8mm, 10mm, 18mm)
- Crimping Tool
- Cleaver (Separate)
- Drill Bit (10mm, 12mm, 13mm, 14mm, 16mm)
- Step Ladders 8"
- Step Ladders 7"
- Spanner 12"
- Combination Spanner (13mm, 26mm, 30mm, 32mm)
- Power Cord 25M
- Ratchet Wrench 1/2
- Deep Box Socket 13mm
- Deep Box Socket 10mm
- Scarfolding Set
- Step Ladder 10ft
- Cleaver Blade
- Power Bank - MI 20,000 AH

3.3. Machinery and equipment

- Splicing Machine (Single and Ribbon)
- Cleaver
- Stripper
- Optical Power Meter
- Power Source
- Earth Tester
- Live Fiber Tester
- Angle Grinder
- Drill Machine
- Invertor
- Hilty machine (500W, 800W, 650W)
- Generator (0.8KW, 3KW)
- Submersible Pump
- Duct Rod
- Metal Detector
- Hilty Breaker
- Measuring Wheel
- OTDR
- Measuring Wheel - Digital
- Head Torch
- Asphalt Cutter

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- KV Genarator
- Hilty Machine 780W
- 9KV Genarator
- Grass Cutter Machine
- Asphalt Cutter blade
- Chain Saw Machine
- Cordless Hammer Drill
- Magnometer

3.4. Safety Material


- Safety Jacket – Green, Orange, White Yellow
- Safety Belt
- Safety Shoes and Safety Boots
- Gloves – Cotton and Rubber
- Safety Goggles
- Raincoat
- RGB Light pole
- Light (flood Lights)
- LED Hand Light (Sanford, 12W, 24W)
- Color Cone
- Caution Board
- LED Flashlight-100W
- Warning Board
- Road Block
- LED Flashlight-50W
- Men At Work Board
- Emergency light

3.5. ODN Components and Accessories

- Pole Brackets (1 Side Bolt)
- Pole Brackets (Spun)
- Termination Brackets
- 2R Brackets
- Straight Clamps
- Angle Clamps
- Grips 8mm
- Grips 14mm
- Grips 18mm
- Spiral Black 3/4"
- Spiral Black 1"
- Earth Rod 12mm
- Earth Wire 7/0.67
- TOA Spray (Black)
- TOA Spray (White)
- TOA Spray (Red)
- Flexible Horse 3/4"
- Flexible Horse 1"
- PVC Pipe 1"
- PVC Pipe 1/2"

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- PVC Pipe 56mm 6m
- PVC Pipe 56mm 90 bend
- PVC Pipe 56mm 30 bend
- PVC Pipe 56mm 45 bend
- PVC Pipe 110mm 6m
- PVC Pipe 110mm 90bend
- PVC Pipe 110mm 30bend
- PVC Pipe 110mm 45bend
- PVC Pipe 56mm Socket
- PVC Pipe 110mm Socket
- GI Pipe 110mm 6m
- GI Pipe 110mm 90bend
- Metal
- Sand
- Nylon Rope 6mm (100M)
- Sub Duct 1"
- Duct Seal
- FDP
- Cassette Type Splitters (1*8)
- Blade Type Splitters (1*8)
- Splitters (1*8)
- Splitters (1*4)
- FTC M1
- FTC M2
- FTC M3
- FTC M4
- FTC M5
- FTC M6
- Pigtails (SC-0.9mm-2m)
- Pigtails (FC-0.9mm-2m)
- Insulation Tape
- Masking Tape
- Cable Tie Nylon 4.8x200 Black
- Cable Tie Nylon 2.5x100 White
- Spiral White 6
- Spiral White 8
- 6.7 PLC
- 8m PLC
- Buckle 10mm
- Steel band 10mm
- Holders 10mm
- Buckle 19mm
- Steel band 19mm
- Holders 19mm
- Lacker (Black)
- Lacker (White)
- Cutter Knife blade
- Hacksaw blade
- Patch Cord (SC-SC/UPC) 1m
- Patch Cord (SC-SC/UPC) 2m
- Patch Cord (SC-SC/UPC) 3m
- Patch Cord (SC-SC/UPC) 5m
- Patch Cord (SC-SC/UPC) 10m
- Patch Cord (SC-SC/UPC) 15m
- Patch Cord (SC-SC/UPC) 20m
- Patch Cord (SC-FC/UPC) 1m
- Patch Cord (SC-FC/UPC) 2m
- Patch Cord (SC-FC/UPC) 3m
- Patch Cord (SC-FC/UPC) 5m
- Patch Cord (SC-FC/UPC) 10m
- Patch Cord (SC-FC/UPC) 15m
- Patch Cord (SC-FC/UPC) 20m
- Timble
- Barigate Tape
- Cement (50kg)
- Patch Panel 48-SC
- Patch Panel 32-SC
- Splitter Subrack
- Splitter Subrack
- Cable Tie (7.6x450mm)
- Nylon Rope 10mm (100M)
- Stay Rod (with Bow & plates)
- 5.6m PLC
- Guy Wire (Stay Wire)
- Man Hole (HH2)
- Extention Bracket Horizontal 600mm
- Patch Panel 24-SC
- FTC M10
- Guy Grip 38G
- Top Bolt
- 2R Bracket (Spun)
- Patch Panel 64-SC
- Fiber Protection Sleeve
- Concreat Slab (2x1ft)

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- Spacer A
- Extention Pole Bracket Vertical
- FTC M11
- 10 U Network rack
- 16 U Network rack
- 9m PLC
- SC Cuplers
- Patch Cord (Fc-Fc/upc) 1m
- Grip 22G
- M5 Primary Panel
- 42U 19"(600x2100x600)Rack
- 110 mm Rubber End Mouth
- 56 mm Rubber End Mouth
- L Angle 1 1/2 x 1 1/2 x 3mm
- GI Socket 110mm
- GI Bend 110mm 30'
- Man Hole Cover With Frame HH2
- Strut Bracket
- Blade Type Splitters (1*4)
- 16U 19" Mounting Rack
- Patch Panel-32 FC
- Manhall HH1
- Manhall Cover With Frame HH1
- Street Cabinet 600 Port
- Manhole HH3
- Manhole Cover With Frame HH3
- Cassette Type Splitters (1*4)
- FTC M9
- Patch Cord (FC-FC/UPC) 2m
- Patch Cord (FC-FC/ UPC) 5m
- Patch Cord (FC-FC/ UPC) 10m
- Patch Cord (FC-FC/ UPC) 15m
- Patch Cord (FC-FC/ UPC) 20m
- Extension Bracket Horizontal 300mm
- Extension Bracket Horizontal 1000mm
- 7U 19" Wall Mounting rack
- 96 Patch panel -SC
- 96 patch Panel -FC
- 31U 19"(600x650x600)Rack
- 21U 19"(600x1000x600) wall Rack
- Patch Panel 64-FC
- Patch Panel 48-FC
- Patch Panel 24-FC
- Street Cabinet 600 Port (1180x450)
- FTC M8
- PVC 110mm Flaird Mounth
- PVC 56mm Flaird Mounth
- Splitter 1x32

----- End -----