

SaskTel fibre guidelines for Single Family Units (SFU)

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General Information

Purpose of guide

This guide is intended to assist you in pre-wiring your new home for communications service. This guide applies only to single-family residences. For other dwellings or business applications, please contact SaskTel.

Disclaimer

Please note that in no circumstances will SaskTel be responsible to you or any other party for any loss of service or material or personal injury or property damage of any kind or nature resulting from either directly or indirectly work performed either by yourself or others on your behalf on inside wiring.

Description of pre-wiring

Pre-wiring is a method of installing communications wiring so it is concealed within the walls of your home. This is done at the framing stage, when the electrical wiring is placed, before the application of insulation, drywall, and vapor barrier. Once the walls have been surfaced, wiring cannot be removed or replaced without disturbing the wall.

Customer wiring options

The customer has the following options to complete the pre-wiring by hiring:

- an electrician or general contractor,
- yourself,
- SaskTel.

Note: The customer may be responsible for costs associated with the installation and repair of all wiring (inside or out) and associated hardware past the SaskTel Fibre Network Interface Device (NID) and/or Demarcation Point. For copper services this is at the NID and for FTTP services this is the Fibre ONT (see figure 5).

Owner/Developer Responsibilities

SaskTel is currently under the process of transitioning from traditional copper fed communication systems to Fibre Optic fed telephone systems. It should be understood that the customer responsibilities towards preparing a structure for these two types of services are essentially the same, with few minor differences.

The owner/developer is responsible to prepare the single family unit for the installation of fibre based communication services by complying with the following:

- Ensure all communications cabling and jacks are **CSA** (Canadian Standards Association) **approved** and placement of all cable conforms to the **Canadian Electrical Code**.
- Provide an **access hole, 1 3/8" (34mm)** from inside of the premise to the area near the outside power meter (6" to 8" left or right of power meter or its **entry** conduit) (see Figure 1a). As required, SaskTel will mount their Network Interface Device (NID) at this location, and penetrate the residence. The hole diameter will allow SaskTel to properly conduit the fibre service entry into the residence without damage. Please note that the power entry conduit is the location where power actually penetrates and enters the premise.
 - In instances where the power entry is moved from the meter location to penetrate the unit at a different location. The **access hole** will remain at the meter location, and all cables and access pathways run from this point to the "**common location**" inside the unit. This is because SaskPower and SaskTel buried cables **TERMINATE** at that location.
- Provide a "**common location**" and an **access pathway** from this "**common location**" to the **1 3/8"** access hole, and NID location outside the home. This **access pathway** must enable an easy cabling route to reach the access hole and SaskTel NID location without any obstruction. (Figure 1c).

This **access pathway** will allow SaskTel to install Fibre Optic cables to the "**common location**", when the unit's neighborhood is fibre optic ready.

IF your neighborhood is not initially fibre ready the ACCESS PATHWAY IS STILL REQUIRED, for the future installation of fibre optic cable. This will eliminate the need for physical reconstruction inside the home to run the fibre optic cable.

- The **access pathway** can consist of; a point to point $\frac{3}{4}$ " non-metallic rigid or flexible conduit, with a pull string inserted. Ensure that any non-metallic conduit used will meet Canadian Electrical Code and Building code requirements. There are many type of this conduit available in the marketplace today, contact SaskTel or talk to your local contractor for more information.

- or an open ceiling and wall construction that will not prove any obstruction to running cable from the **access hole** to the **common location**.
- At the customer's option, a 12"x 48" wooden backboard may be placed immediately adjacent to the power backboard. This will be used for securing the SaskTel NID, if required. If the customer does not have a backboard in place, or does not wish to install one, SaskTel may need to mount the NID directly to the side of the building (see figures 1).

If the above owner/developer responsibilities are not met when SaskTel arrives to install service, the SaskTel may/will need to:

- Install a NID on the exterior of the house
- Drill through house joisting, sill, or foundation to penetrate the residence.
 - Reroute the entry cabling to other locations around the home (via the exterior or the interior or both), using the entry cable itself, or cable and path deemed appropriate by SaskTel.
 - Rerouting may include; trenching around the foundation wall; attaching with mounting material (i.e. staples, e-clips, etc) to the walls; inserting cable into or underneath trim; fishing/routing through walls, ceilings or other spaces.
- Establish a “common location”, via SaskTel mounting equipment, at the most convenient location for access to the entry cable, the existing house communication wiring and electrical outlets.
- Run the entry service fibre cable to the “common location”.

For fibre considerations, the “common location” with ONT/media panel is to be placed, is in a heated environment **where there is no risk of the ambient air temperature falling below 0° (zero) Celsius**. A non-heated garage is NOT a suitable location. The preferred location is in HVAC room, utility closet, or laundry room etc. Builder/Owner will need to provide or have available; one (1) duplex 15A non-switched power receptacle dedicated to networking equipment at this location.

For new service installations, SaskTel is responsible to:

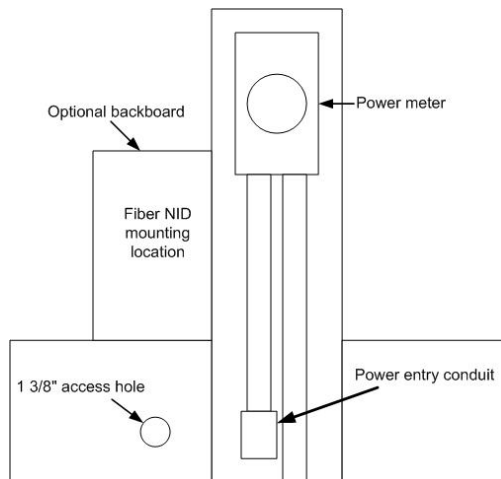
Provide and install the mounting box and/or mounting bracket (where applicable), and if required the NID and associated PVC 3/4" (19mm) conduit on the exterior of the premise. (Refer to Figure 1). SaskTel typically installs the mounting box and/or mounting bracket 48"-54" (120cm - 140cm) above the ground level. This height may vary according to building type and service entry location.

For fibre optical cable entry, SaskTel will install the fibre entry cable directly into a house by using conduit (rigid or flexible) and a 3/4"LB fitting. SaskTel will only mount a NID as a transition point to a different SaskTel bend insensitive fibre for extended entry installations or fibre repair. (figure 1b)

Inspect, terminate, test and activate the SaskTel entry cable in the NID and/or in "common location" at the ONT.

Pre-cabling Planning and Installation

Figure 1a: Approximate location of access hole



Note the access hole is at the same height as the electrical entrance.

Figure 1b: Location of access hole with entry options

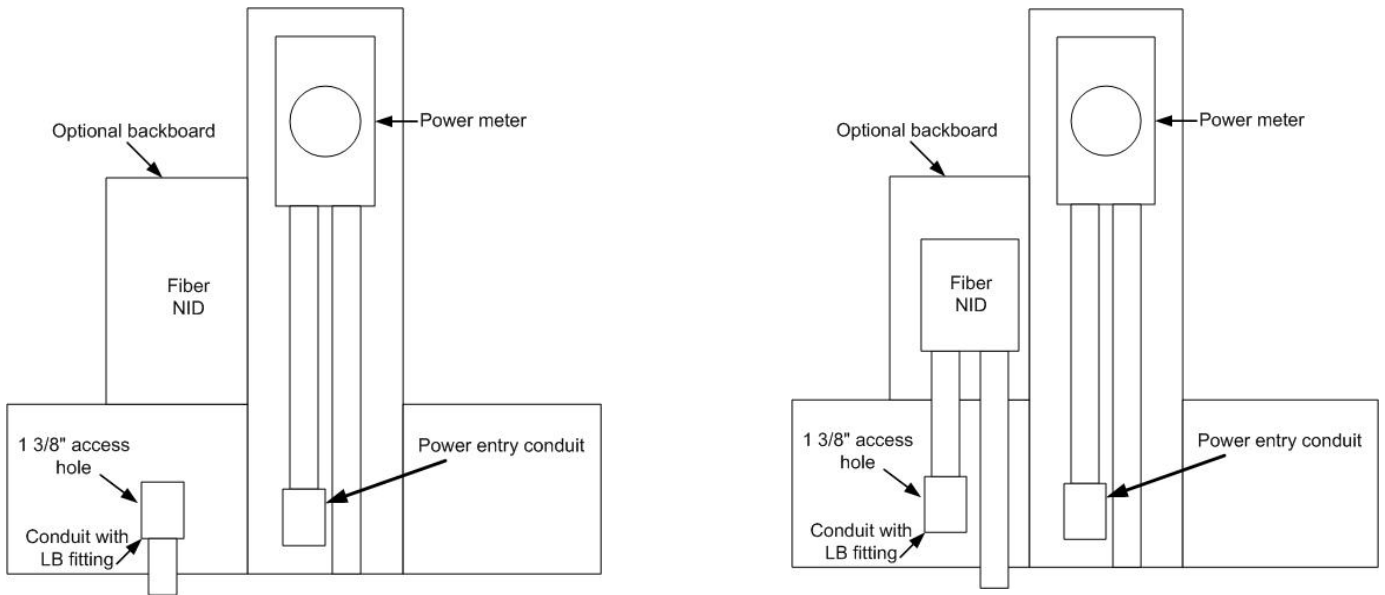


Figure 1c: Layout of entry, access pathway and common location



- **Common Location** (distribution device): the central location where all premise communication cabling terminates and cross-connects to feed the premise network. SaskTel facilities are cabled to this common location and then distributed through-out the residence via a distribution device. All new residential wiring standards including the North American TIA-570-B recognize the increasing complexity of residential communication cabling. As such these call for higher grade wiring with larger outlet numbers and drop counts inside the home. This is consistent for coax, UTP (unshielded twisted pair) and optional fibre-optic cabling.
 - Basic grades of residential cabling are RG-6 75 ohm coax, 4 pair category 5 UTP, and single mode 900 micron tight buffered G.657B bend insensitive fibre incased within a SaskTel standards approved jacket. The industry standardized “**minimum**” drop count inside each communication outlet is 1 coax and 1 CAT5 UTP per outlet.
 - These higher cable counts require a separate distribution panel space, at a “**common location**”: such as beside the electrical panel box. This panel can consist of a ¾” sheet of plywood to mount devices, or can be a dedicated “multimedia enclosure”. In any instance the minimum working space of this panel is (24”w x 36”h) for plywood, and (14.35”w x 30”- 42”h) for a multimedia enclosure. These are the industry standardized sizes for distribution panels accommodating 9 to 16 terminated cables of any type (coax, UTP, fibre) and to account for any additional required communication equipment (see figures 4 and 5).
 - In addition to the panel, a 15 A, 120 VAC nominal, non-switchable duplex electrical outlet shall be provided within 1.5 m (5 ft) of the panel. The height of the electrical outlet should be appropriate for the panel and any associated equipment being installed. Alternatively, the distribution panel can have its own outlet. This is an industry requirement for all panels that will be providing more than basic telephone, satellite, or community basic cable. To name a few, these advanced residential communication services can be VoIP telephony, high-speed internet, high definition television receivers and multi tuner HD personal video recorders, digital interactive video, Internet Protocol Television. All these are readily available today in the Saskatchewan marketplace, from all telecommunication, cable and satellite companies.

Note: It is important to remember that the numbers of cables recommended are “minimum guidelines”.

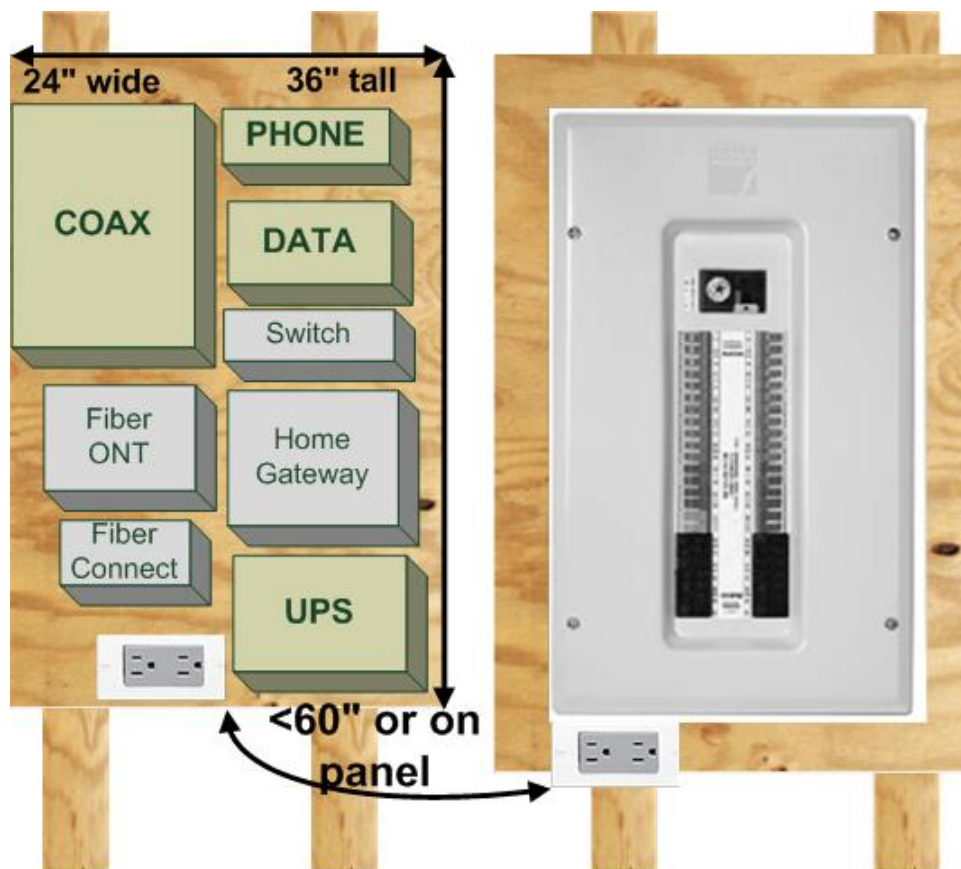
The actual number cables and types needed for each individual communication outlet are determined by the “actual” number and type of devices each outlet will feed.

Telephones, computers, IPTV boxes, media server boxes, gaming systems, etc. each require a minimum of 1 run of CAT5e for each such device at that location.

Furthermore, satellite receivers, cable digital boxes, etc require a minimum of 1 run of RG6 for each such device.

Diagrams of the Distribution Panel and Multimedia Enclosure at the Common Location, with space for communication equipment layout

Figure 4: Example of a distribution panel mounted beside the electrical panel



Example of an actual new electrical entry meeting space requirements to flush mount SaskTel Fibre Optic Equipment and extra room to flush mount extra customer equipment (alarm systems, lawn watering timer). Note that the space is for “all” companies’ equipment not just SaskTel’s.

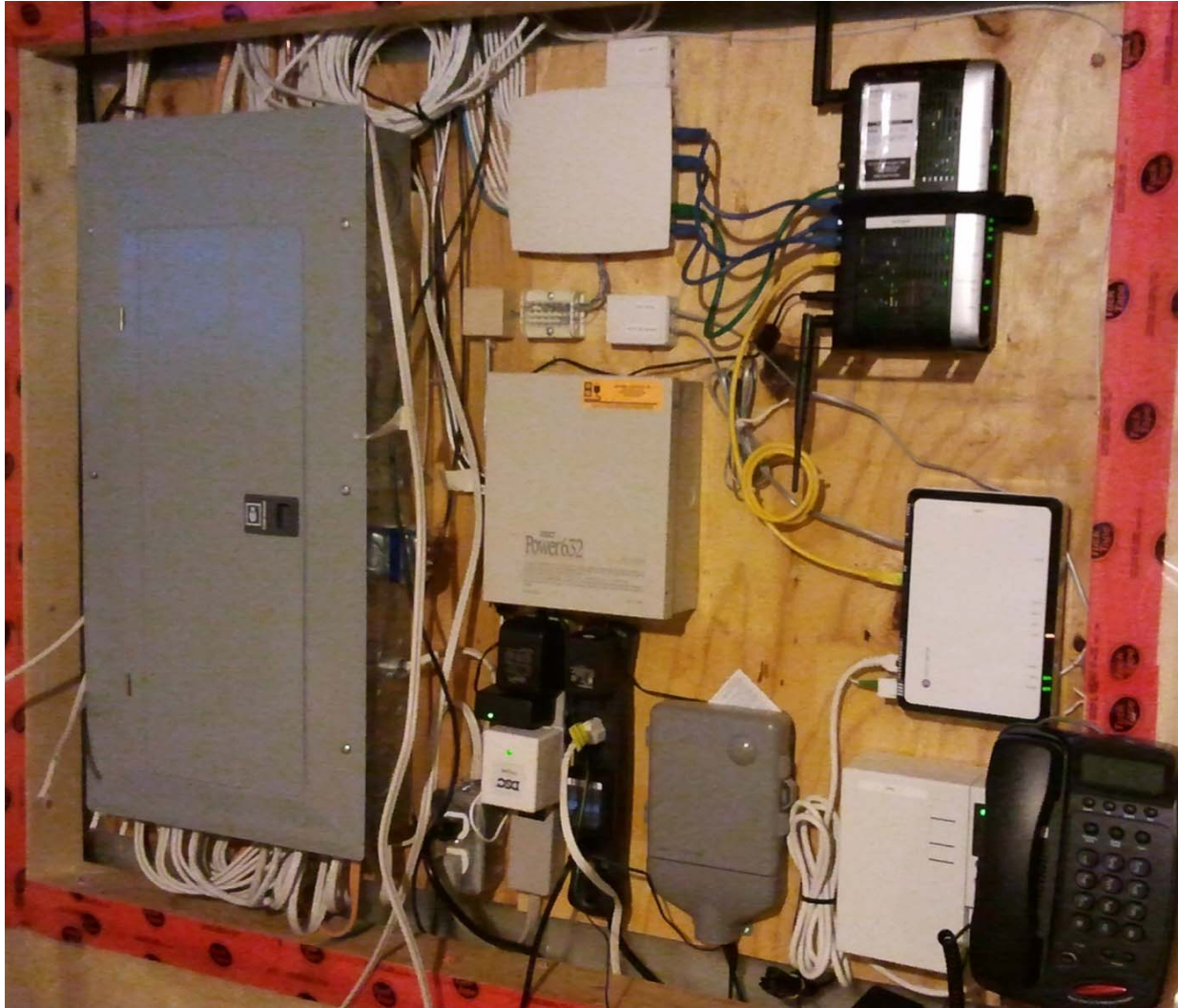
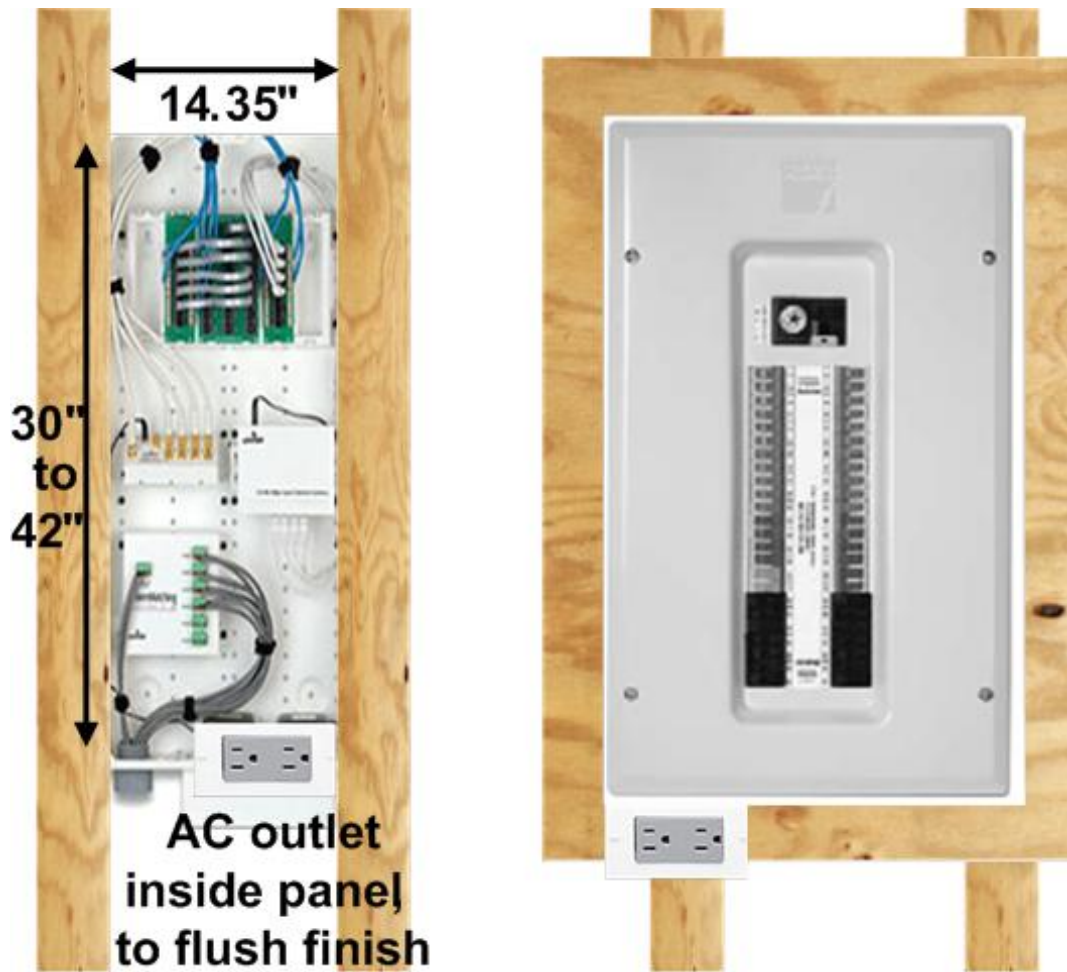


Figure 5: Example of a multimedia enclosure flush mounted in between the standard stud spacing (note some UPS's may be too deep to fit inside this enclosure)



The installation of a multimedia box such as below, is designed to fit in between the 16" joist spacing and allows equipment to be housed and hidden in an enclosure that is flush to the wall it is installed upon. A soft ABS or plywood backed multimedia box is needed to flush mount equipment into these devices.



Wire Standards

Requirements for handling fibre and copper cable

- As mentioned under “common location”, the standard wire used and recommended by SaskTel is category 5e, four twisted pairs of 24 AWG solid copper wires. All wire used must be CSA (Canadian Standards Association) **approved** and placement of all wire must conform to the **Canadian Electrical Code**.
- SaskTel requires running the wiring from each jack location to a “**common location**”. This install follows the star wiring or home run pattern. All wires should be terminated at the “common location” to allow continuity of all wire pairs for future installs and repairs.
- Do not splice pieces of cable together for runs. This could cause future troubles that may not be accessible for repair.
- Secure any cable as needed by placing **appropriate** fasteners designed for said cable at approximately every 24" (60cm). Avoid kinks and sharp bends in the cable. Care is needed not to place fasteners through the cable. If this should happen, replace that cable in its entirety.
- IF stapling is required, never use standard flat or square staples with Cat 5 or fibre cable. Use only an Arrow stapler with round head staples, ensuring that the staple long enough to be loose and does not crush the cable.
- Use nail plates to protect the cable when there is not 1 1/4" clearance
- Drill independent 3/4-inch holes 1 1/4" from edge of framing members to run your cable.
- Observe the maximum distance rule that limits a Category 5 or 5e run to 90 meters or approximately 295 conductor feet.
- Do not run cable within 6" of any electrical wiring, in heating ducts or vents, or near hot water pipes or chimneys. Damp or wet areas (basement floors, bathrooms and some outside walls) should be avoided. **Note:** The CSA has specific regulations regarding bathroom locations.
- Never run low voltage cable in the same drill holes as AC wiring
- Run your low-voltage cable away from AC cable by using a separate stud space whenever possible; otherwise, maintain at least an 8 inch distance (more is better) when running parallel to AC and if you must cross it, do so at a 90 degree angle
- Avoid damage to cable by using less than 25 pounds of pull force, and by only going around one bend at a time when routing cables around corners.
- Aim for sweeping bends in your installations rather than sharp turns that can damage the cable.

- When running your cable in conduit, leave a pull cord to facilitate new wiring (do not exceed a 40% fill rate)
- A standard electrical box should be placed at each location a communications jack may be required. The boxes should be mounted approximately 12" (30cm) (normal electrical outlet height) above the floor.
- Install your cables inside inner wall spaces to avoid outer wall insulation and firebreaks.
- Avoid running external wires; if you must, install them in conduit.
- Label each cable run to assist in installation and trouble-shooting.

Location considerations

- Take into consideration present and future needs (e.g. second line, children's line, computer modem, fax machine, television, security system, internet devices, fridge, TV's, etc.) (see Figure 6). For example, where there may be multiple service (voice, data, or television), two category 5e runs should be installed. This may save extra wiring charges or surface wire runs at a later date.
- In large rooms place for functionality of the room.
- Do not place communication outlets back to back. They should be at least one stud away from each other.
- Recommended locations for communication service are master bedroom, spare bedrooms/den, living room, kitchen, dining room, family room, deck and garage (see Figure 6).
- It is recommended that a communication jack be installed with any coax outlet. This will allow for future television requirements such as satellite television or entertainment service from SaskTel.
- Take into consideration ease of accessibility, traffic and furniture placement. Jack locations should be accessible and in areas where they won't be damaged by furniture or normal activities.

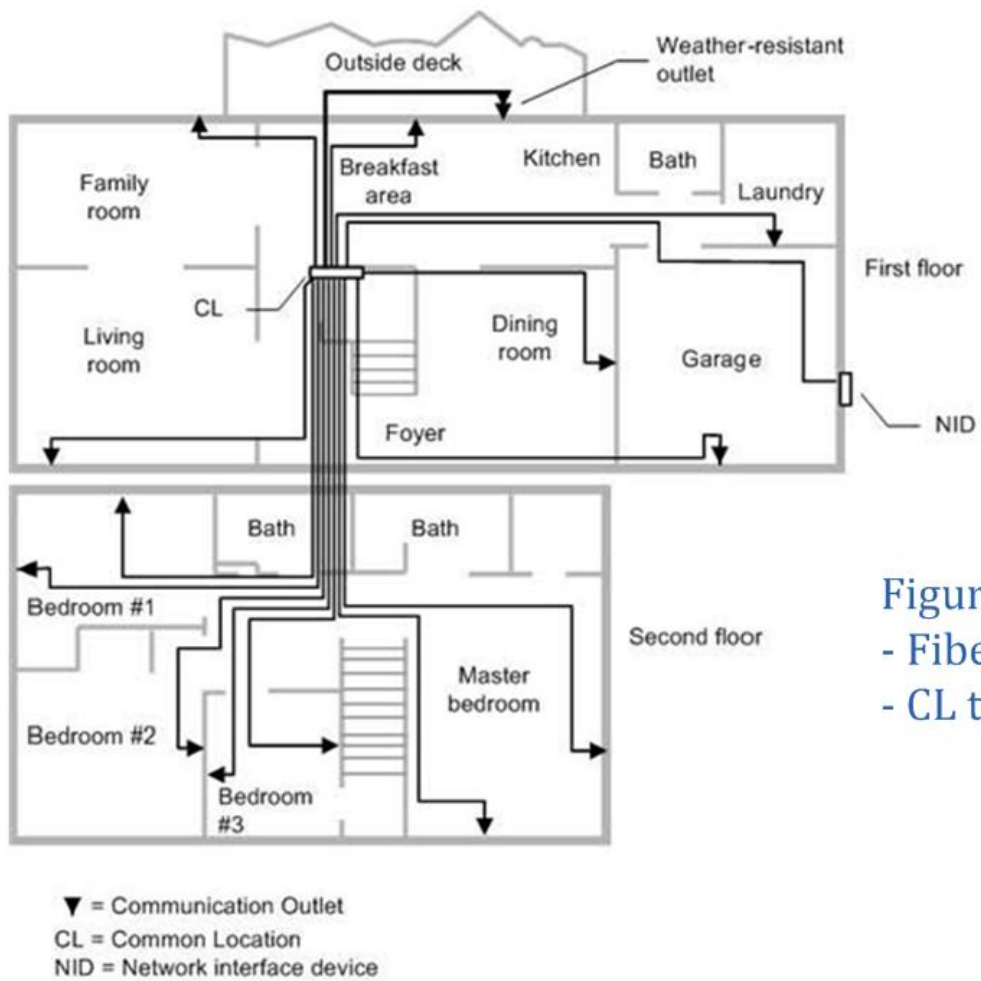


Figure 6: House cabling:
 - Fiber NID to CL
 - CL to outlets

Appendix: FTTP Customer Premise Equipment

Please note that this equipment is subject to change.

Optical Network Terminal (ONT)

The **Optical Network Terminal (ONT)** is the device where the fibre signals are converted to electrical signals **that can feed telephones, television sets, and computers**. The ONT is located in the suite. In Single-Family Units (SFU's), there is a separate ONT for each suite/home.

There are two options in which the ONT can be placed within the Living Unit:

1. The preferred option is the placement of the ONT and associated components in a recessed wall cabinet (for example a Multimedia cabinet) at the common wiring location within the residence. The use of a recommended cabinet, allows for the neat and proper installation of all the required fibre devices and wiring into a location that is unobtrusive and secure.
2. The other option is to surface mount the ONT and associated components at the common wiring location within the home

MDUs use the same ONT as used in single family detached units. It is designed to interconnect with conventional Structured (Cat5e) Wiring in each Unit. The multimedia cabinet does require **local electrical power** and a ground connection (i.e. grounded power receptacle) in each unit.

The ONT is to be placed in a heated environment **where there is no risk of the ambient air temperature falling below 0° (zero) Celsius**. A garage is NOT a suitable location. The preferred location is in at the common wiring location be it in the HVAC room, utility closet, or laundry room etc.



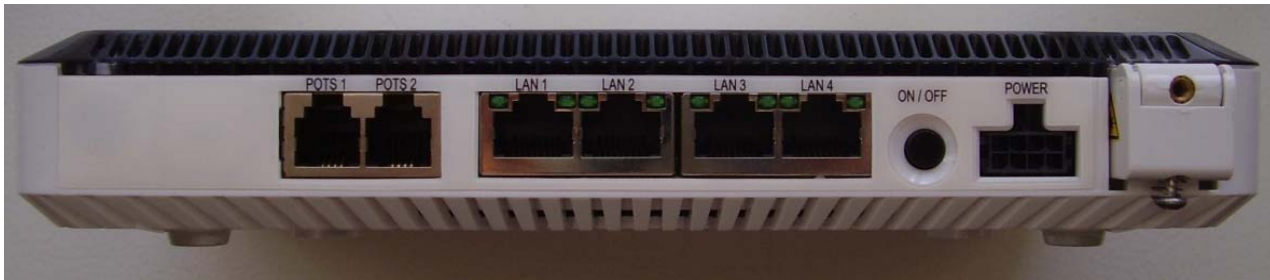
ONT Model	Alcatel (I-240G-B) Optical Network Terminal
ONT Type	Indoor
	B+ optics, TX output power, at industrial temperature, (0.4°C to +65°C system inlet air temperature) (min)+1.5 dBm (max)+5.0 dBm
Dimension (H*W*D)	208.3*142.2*33.0mm / 8.2*5.6*1.3 inch
Weight	270grams / 9.5oz

Demarcation at the ONT provides a point of demarcation between SaskTel's network facilities and the customer's inside wire for voice and data services. With SaskTel's new Fibre Optic Network, SaskTel's network now ends at the ONT. Therefore, the demarcation point separating SaskTel's voice network from the customer equipment is located on the ONT.

Testing your telephone service

To test your telephone service:

1. Locate the ONT.
2. Locate the wires on the back side of the ONT.
3. Locate the jack ports labeled POTS1 and POTS2. POTS stands for Plain Old Telephone Service, or in other words voice and dial-tone.
4. Unplug the line jack feeding from this outlet.
5. Only unplug one line at any time,
6. Only ever unplug the line feeding from the POTS outlets.
7. Do not unplug the power from the ONT, if required push the power button to power off.
8. Plug in a good telephone set directly to the port.
9. If the telephone set works, the trouble is with your in house wiring or equipment. You have the option of calling SaskTel (611 to repair)
10. If the telephone does not work, plug the line back in, and contact SaskTel Repair Service (611).



Uninterruptable power supply

The **uninterruptable power supply (UPS)** is an electrical apparatus that provides emergency power, via a backup battery, to the ONT when the power fails. This is important to power the ONT - enabling telephone service in power blackout situations.

The UPS contains a sealed maintenance-free lead-acid battery that has a life expectancy of about 5-8 years. The battery is 7.2 Ahr which translated means approximately 8hrs of phone service in the event of an extended power failure.

It also has a 20% battery remaining emergency call feature that during an outage will power down to conserve the last 20% of the battery. This allows the customer to make emergency calls past the 8hr period. The UPS also has an audible alert to warn of bad battery or battery replacement.



Model	Delta DUPS-1232A Uninterruptible Power Supply
Output Voltage	13.5 ± 5% Vdc
Battery Type VRLA	12V/7Ah (or 7.2Ah battery to ensure 8 hours of voice backup)
Operating Temperature	-2 0 ~ +50° C
Operating Humidity	0 ~ 95 % RH (Non-condensing)
Weight without Battery	0.9Kg /2.01lbs
Dimension(H*W* D)	190*260*80.4mm / 7½*10¼*3¼ inch

HomeNet Gateway

For customers that have SaskTel TV and Internet services, they will require network equipment to receive those services. The HomeNet gateway enables you to create a wired or wireless home B/G/N-network. With HomeNet, you can:

- Network the computers in your home or small office.
- Simultaneously access the internet on multiple computers, and share documents and printers from any of your networked computers.
- Protect and manage online experience by: restricting access by day of week and time of day and control access to different sites and services.
- Keep your computers secure with automatic firewall updates for all the devices connected to your network.

Model Actiontec V1000H

Interfaces

- Four 10/100/1000 BaseT Ethernet LAN
- One 10/100/1000 BaseT EthernetWAN
- One HPNA 3.1 LAN or WAN

Wireless

- 802.11 b/g/n
- Multiple SSID
- WPS
- Wireless Security
- Wi-Fi Protected Access (WPA,WPA2), WEP, TKIP encryption 802.1x authentication
- Pre-Shared Key (PSK)
- MAC Address Filtering



Minimum System Requirements

- PC or Macintosh with Ethernet or 802.11b/802.11n wireless connection.
- Internet Explorer 7.0+, Safari, Firefox

Power Adapter Output Requirements 10VDC, 1.6A

Physical Dimensions 10" x 7.25" x 1.75" (Positioned horizontally -antenna adds 6" to height)

Network switch



For customers that have 4 or more STB's or have more than 1 wired network computer connection, SaskTel may/will need to install a network switch to splice the data connections off the back of the residential gateway to provide more wired access ports.

Model D-Link DGS-1005G 5 Port Gigabit Desktop Switch

Number of Ports 5 x 10/100/1000Mbps auto-negotiation, auto MDI/MDI-X ports

Data Transfer Rate

- Ethernet: 10Mbps (half-duplex) / 20Mbps (full-duplex)
- Fast Ethernet: 100Mbps (half-duplex) / 200Mbps (full-duplex)
- Gigabit: 2000Mbps (full-duplex)

Topology

- Star DC inputs
- Switching = 5V/1.2A

Dimensions (W x H x D): 144.2 x 100.2 x 32.6 mm (5.7 x 4.0 x 1.5 inch)

Temperature Operating: 0° ~ 40° C (32° to 104° F)

Humidity

- Operating: 10% ~ 90% RH, Non-condensing
- Storage: 5% ~ 90% RH, Non-condensing

Structured wiring enclosure

Model – P3000 from Primex Manufacturing
Structured wiring enclosure – ABS material

IDEAL FOR WIRELESS DEVICES– NO INTERFERENCES

FEATURES:

- 4 Knock out entry points at the bottom – 3 x 1.00" and - 1 x 1.25"
- 2 x AC standard receptacles mounting ports
- 10 entry knockout points at the top - 8 x 1.00" & 2 x 1.25" conduit adapters
- Polymer is rust and dent proof
- Ample room to work in
- Houses both cable and telecom service provider equipment in one location for easy service and hook-up
- Flush mount enclosure fits between 16" studs
- Flame Retardent ABS Polymer Material

APPLICATION

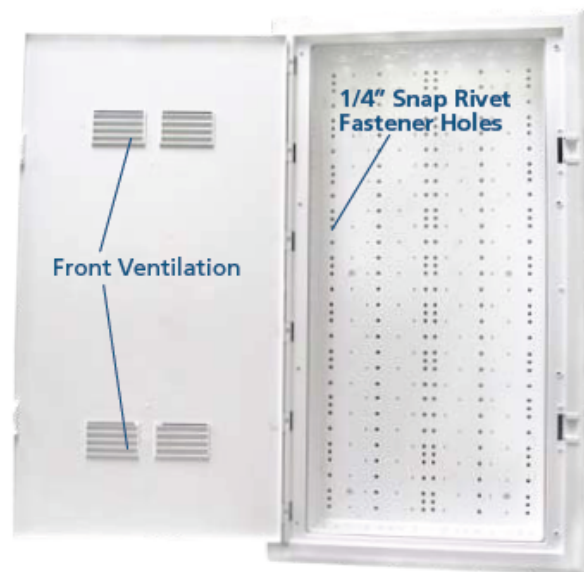
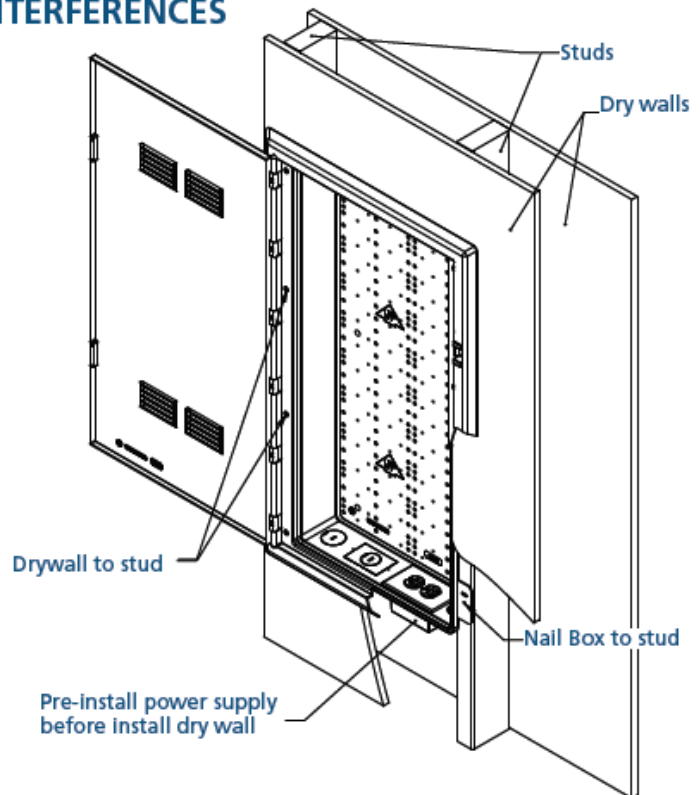
- The 30" enclosure provides a central location for cable & telephone services distribution set runs for residential & commercial premises.
- Mounting hole pattern accommodates 1/4, 1/2 & full length expansion modules in both vertical & horizontal arrangement
- Compatible with most standardized patch panels, voice, data, video & audio quick connect distribution modules.

Inside Dimensions:

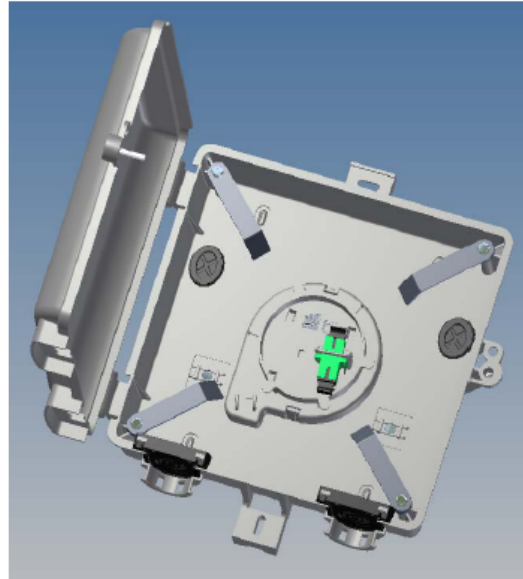
H: 30", W: 14.0", D: 3.5"



** Custom hardware and private labelling are available by special order*



Network interface device



Fibre Optic Network Interface Device, if SaskTel cannot access directly into the access pathway, or the initial drop is damaged, a network interface device will be required to be mounted on the side of the home.

Model TII 506F-01-01-01 Fibre Interface Device Slack Storage Unit
Bulkhead adapters 1 SC to SC
Slack Storage 23m (75') of 3mm BI fibre
Dimensions (H x W x D) 260 x 252 x 74 mm (10.26 x 9.94 x 2.91 inches)

Interior/Exterior fibre drop materials – Bend Insensitive Drop

If a customer wishes to install their own bulk fibre optic cable, SaskTel has standardized on a couple different versions of “bend insensitive” fibre optic cable. There are many different types and brand of fibre optic cable and only a very few are compatible with SaskTel FTTP. Installation of non-recommended fibre optic cable would likely result in an inability to use the cable, and a waste of time, money and effort.

Corning Cable Systems ClearCurve™ Rugged Drop Cables are part of a product family developed to solve the challenges associated with multidwelling unit (MDU) deployments. Enabled by a truly bend-insensitive fiber using Corning nanoStructures™ Technology, this rugged drop cable can be bent to a minimum bend radius of 5 mm (0.2 in) and be directly stapled to wall studs and rafters with standard cable staples and hardware-store variety staple guns.

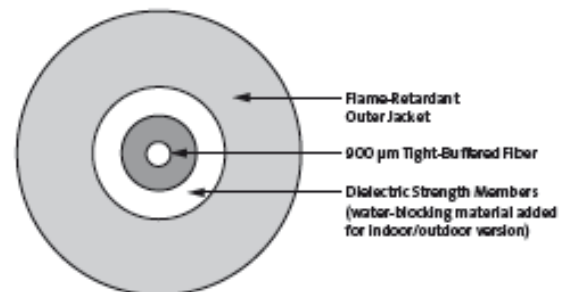
The cable consists of a single bend-insensitive fiber tight-buffered with a 900 µm jacket, surrounded by dielectric strength members and an outer flame-retardant jacket. Two versions are available. The first is an indoor-only version available with a standard yellow jacket or an optional neutral jacket. The second is an indoor/outdoor version that is fully water-blocked with a black UV-resistant outer jacket. Both versions are riser rated (OFNR) for vertical riser and general-purpose horizontal applications.



ClearCurve Rugged Drop Cable | Photo CCV014

Features / Benefits

- Better than coax, ClearCurve Rugged Drop Cable outperforms typical RG-6 coaxial cables with a:
 - Higher bandwidth-carrying capacity
 - Smaller outer diameter
 - Lighter weight
 - Smaller minimum bend radius
- Rugged, bend-insensitive cable design can be directly stapled to wall studs and joists using standard cable staples and hardware-store variety staple guns
- Self-bend-limiting design enables installers to route cable around tight corners down to 5 mm (0.2 in) radius without need for special handling procedures or bend guides



4.8 mm ClearCurve Rugged Drop Cable | Drawing ZA-3186

Specifications

Maximum Tensile Loads	Short Term: 450 N (100 lbf) Long Term: 150 N (30 lbf)
Temperatures	Operation/Storage: -40° to +70°C (-40° to +158°F) Installation: -10° to +60°C (+14° to +140°F)
<i>Note: Corning Cable Systems recommends storing indoor/outdoor cable in a proper temperature environment prior to installation to allow the cable temperature to meet installation temperature range specifications for best results.</i>	
Approvals and Listings	NEC® OFNR, CSA OFN FT-4
Common Installations	MDU drop cable applications from last terminal to and within living unit including outdoor and indoor vertical riser and general-purpose horizontal according to NEC Article 770
Design and Test Criteria	ANSI/ICEA S-104-696; Telcordia GR-409

Fiber Count	Nominal Weight kg/km (lb/1000 ft)	Nominal Outside Diameter mm (in)	Minimum Bend Radius	
			Loaded mm (in)	Installed mm (in)
1	21 (13.7)	4.8 (0.19)	5.0 (0.20)	5.0 (0.20)

Let SaskTel provide a skilled technician for your wiring needs.

For information on current rates or to book an appointment, contact:

1-800-SASKTEL
(1-800-727-5835)