Frequently Asked Questions

Q: How quickly can SkyWrap be installed?
A: A crew of 6-8 can normally install one full cassette of SkyWrap (up to 5km / 3 miles) per day when wrapping on a ground wire. Wrapping on a phase conductor is normally slower as the spans between towers or poles are shorter, an experienced crew should be able to achieve 3km (2 miles) per day. When higher installation rates are required, multiple installation crews can be deployed.

Q: Can AFL provide a turnkey installation?
A: Yes, the success of the SkyWrap solution resides in the ability of AFL to provide a turnkey solution. Expertise, specialist equipment, technical design and project management experience all go towards an installation package that is executed quickly and cost effectively. AFL has carried out turnkey projects throughout the world selecting, training, managing and overseeing local installation crews. The range of project can vary from a straightforward aerial fibre optic link (including splicing and testing), to a full design and install project including both active and passive end equipment.

Q: What equipment and manpower is needed?
A: For a typical SkyWrap installation AFL will supply two wrapping machines, two remote control tugs, two jib poles, cassettes of SkyWrap cable and all the necessary conductor-attached accessories. The equipment will fit into a vehicle with a load area of approximately 2m x 3m (6 x 10ft). All the installer needs to provide is a crew of 6-8 linesmen plus the normal tools used on overhead line work such as a winch or other lifting tackle, ropes, lanyards, small pulley blocks and four calibrated torque wrenches for fitting the accessories.

Q: Is SkyWrap installation equipment readily available?
A: Yes, most SkyWrap installation equipment is based at AFL's facility in the UK and is shipped to site with the cables and accessories for a designated installation. Some equipment is also located at other facilities in Europe, North America and Africa to support local customers in those regions. Equipment can be leased for long term installation and maintenance projects.

Q: What personnel skills are needed to install SkyWrap?
A: SkyWrap is installed by personnel who are skilled and qualified to work on overhead lines. AFL provides full training for line-crew if they don't have experience working with and installing SkyWrap. Installations are usually carried out by the utility customers own personnel, contractors or a combination of these and AFL Engineers.
AFL Engineers are required to adhere to safety regulations and practices laid down by AFL in addition to any customer codes of practice, local regulations and legislation.

Q: Where can personnel and resources be sourced to carry out a SkyWrap installation?
A: Skilled line-crew for a SkyWrap installation can be: The Utility customer's own personnel; personnel provided by a contractor known to the Utility customer and having prior approval to work on the customers assets; or personnel from a 3rd party contractor already equipped with skills in SkyWrap installation and with working on overhead lines, but which may need to be approved in some way by the Utility Customer. Where the selected line crew do not already have SkyWrap installation experience AFL provides this as part of the build-up to the installation work.

Q: Can SkyWrap be installed Live Line?
A: Yes, installation of SkyWrap onto the ground wire can normally take place under live-line conditions, providing that there is sufficient safety clearance between the ground wire and phase conductors. Most SkyWrap cable installation on lines above 200kV has been carried out under live-line conditions. AFL offers a clash analysis service whereby the tower geometry and line details are assessed to review the possibility of installing with either one or both circuits live. Phase wrap installations obviously require the circuit being wrapped to be switched out, but in many cases the opposite circuit on a dual circuit line can be left energised.

Q: Can SkyWrap be installed if OPGW is already installed?
A: Yes, SkyWrap can be installed directly on OPGW. It is often the most efficient way to increase network capacity without disrupting the existing communications link.

Q: There is no ground wire in existence, can SkyWrap still be installed?
A:Yes, SkyWrap can be installed on phase conductors and is often the only solution suitable when OPGW and ADSS are not appropriate.

Q: Can SkyWrap be installed on overhead lines fitted with Aircraft Marker Balls?
A: Yes, aircraft marker balls must be removed from the conductor or ground wire which is going to host the SkyWrap cable prior to installation. They are subsequently re-instated using specially adapted marker balls that are compatible with SkyWrap, installed from a conductor trolley (provided by AFL) which is designed to pass over the SkyWrap cable without damage.

Q: Can SkyWrap be installed on overhead lines fitted with spiral vibration dampers and bird flight diverters?
A: SkyWrap is not compatible with preformed-type conductor accessories such as SVDs and BFDs. These must be removed before installing SkyWrap. The preformed-type devices may be replaced by clamp-on accessories such as dog-bone dampers. However, SkyWrap cable acts to disrupt airflow over the host conductor or ground wire because of its helical geometry, therefore it may not be necessary to install additional vibration damping equipment.

Q: Can SkyWrap be installed on ground wires or phase conductors when one or more full tension splice is present in the span?
A: Yes, the SkyWrap installation equipment is designed to pass over obstructions on the host wire to a maximum diameter of 60mm (2.3") including repair rods and full tension splices.

Q: Do towers need extra load tolerance or other modifications to install SkyWrap?
A: No, installation of SkyWrap only increases the host conductor weight by about 15kg per 300m (35lbs per 1,000ft) span which is well within the capacity of most towers. SkyWrap does not affect the ground clearance of existing lines so no modification to existing structure is required. If necessary, a tower strength analysis could be carried out prior to installation to ensure that the 300kg (660 lbs) all-up weight of the installation equipment is acceptable. AFL can assist with these studies.

Q: What environmental conditions will SkyWrap tolerate?
A: SkyWrap is designed to withstand the aggressive environment encountered on overhead lines. The cable and accessories are resistant to lightning, fault current, electric field, vibration, ice, sunlight, rain, pollution and some designs are available for areas at risk of shotgun damage. The operating temperature of SkyWrap cable is -40 - +85°C (-40 - +185°F). SkyWrap can be installed just about anywhere.

Q: Is SkyWrap affected by Lightning?
A: No, Lightning will never 'strike' SkyWrap because the lightning will ground itself directly on the host ground wire rather than passing through the dielectric material of SkyWrap. Although large amounts of heat can be generated in the ground wire by a lightning strike, thermal transfer between the ground wire and SkyWrap is minimal because of the small contact area. Testing has shown SkyWrap remains undamaged following a lightning strike with enough energy to melt 4 strands in an ACSR conductor.

Q: Is SkyWrap damaged by dry-band arcing, corona, or other electric field related effects?
A: No, not at all. Unlike ADSS, SkyWrap is in constant contact with its host ground wire or phase conductor along its entire length. This arrangement does not allow electric charge to build up on the dielectric cable and there is nothing to drive currents across the surface of the cable.
Where SkyWrap leaves the protection of an energised host

phase conductor - for example to travel down the tower leg to a joint box - it is protected by a Phase to Ground (PTG) insulator that is designed to withstand the electric field environment. A PTG insulator is required if the ground wire is insulated from the tower structure but not necessary when the host is a ground wire at the same potential as the tower structure.

Q: What is the effect of ice accretion on SkyWrap?
A: SkyWrap remains unaffected by ice build-up on overhead line conductors.

Q: Does SkyWrap accelerate ice build up on overhead lines?
A: Experience has shown that initially ice does build up quickly on the overhead conductor or ground wire which is equipped with SkyWrap. However, once the layer of ice fully covers the SkyWrap cable, the subsequent rate of build is the same as a non-wrapped conductor. SkyWrap does not cause any gross irregularities in the build-up of ice and therefore does not lead to wind-induced problems or mechanical instabilities in the ice layer.

Q: Does SkyWrap cause conductors or ground wires to gallop?
A: No, the helical wrapping of SkyWrap cable disturbs laminar airflow over a conductor or ground wire in the open span of an overhead line. This can actually reduce the tendency for aeolian vibration to develop and may also prevent aerodynamic lift.

Q: Can SkyWrap unwind (un-wrap) during service?
A: No, the SkyWrap installation equipment wraps the SkyWrap cable along the host conductor or ground wire under constant and controlled tension at a pitch length of about 900mm (3ft). It is the accurate control of installation tension that ensures the SkyWrap cable remains in contact with the host throughout the operating envelop of the overhead line – allowing for thermal expansion and contraction of the host, and it's stretching due to ice and wind loads.

Q: What is the maximum fibre count?
A: A single SkyWrap cable carries a maximum of 96 fibres. Two cables can be installed on a single host conductor bringing the fibre capacity up to 192 fibres.

Q: What is the service life of SkyWrap?
A: SkyWrap has a design life of 30 years and recent checks on some of the oldest installations have shown it to have suffered no measurable deterioration after more than 20 years in service. The oldest known SkyWrap installation still in service was installed in the UK in 1987.

Q: What references and qualifications can AFL provide?
A: Over 30,000km of SkyWrap has been installed in 40 different countries in the last 30 years (including more than 2,500km (1,500 miles) in the United States and Canada). Some projects have included large communications initiatives to install national networks such as ESB in Ireland (1,300km) and RTE in France (3,500km).

SkyWrap has been approved by many national electricity companies around the world and follows various international standards such as IEEE 1594-2008, IEC60794-4 and CIGRE (45,106,131,132,133). For a full list of references or qualifications contact AFL.

Q: Which international specifications apply to SkyWrap?
A: SkyWrap meets or exceeds the requirements of IEEE 1594 and IEC60794-4.

Q: How does SkyWrap compare to ADSS?
A: SkyWrap and ADSS are not strictly comparable – they are different technologies and are used in different circumstances. SkyWrap tends to be used in situations where ADSS is unsuited to the application. This would include:

- Towers or poles unable to support the extra load of ADSS cable (especially under ice and wind loads)
- Insufficient ground clearance under the line to allow ADSS to be installed in a low electric space potential regime
- When ADSS would clash with other overhead conductors
- Where there is a risk of crop fires/bush fires under the line
- Where there is a risk of theft or vandalism to ADSS cables
- When the local environment has high levels of pollution
- When the line is close to the sea (within 20km / 12 miles)
- Where regions have low annual rainfall, with long dry periods and occasional mist or fog
- When the overhead line includes spans longer than 600m (2,000ft), especially in high wind areas
- Access to the line is difficult (mountainous, forested or water-logged terrain, urban areas, high value crops, nature reservations or on military grounds).
- The operating voltage of the overhead line is too high
- When planning consents for additional aerial cable cannot be obtained

Q: How does SkyWrap compare to OPGW?
A: SkyWrap and OPGW are not strictly comparable – they are different technologies and are used in different circumstances. SkyWrap tends to be used in situations where OPGW is unsuited to the application. This would include:

- Rapid network build speeds are required
- Cost of replacing an existing-wire with OPGW is too high
- Disruption to electricity supply services and to the local environment is too great to allow installation of OPGW
- Access to the line is difficult (mountainous, forested or water-logged terrain, urban areas, high value crops, nature reservations or on military grounds).
- The overhead does not allow for a ground wire

Q: How will SkyWrap affect conductor line maintenance?
A: Normal line maintenance can still be carried out effectively with SkyWrap installed. AFL has developed strategies to introduce slack into the SkyWrap cable to enable it to be moved aside from the conductor while repairs are carried out. The SkyWrap cable does not need to be cut or replaced and will continue to carry traffic throughout the maintenance procedure.

Q: How are repairs to SkyWrap carried out?
A: AFL has a range of tried and tested SkyWrap repair methods and is able to provide assistance and advice on the best solution for a particular scenario. Typically it is necessary to remove the damaged span of SkyWrap using a specially developed AFL recovery trolley, then install a new span of cable, and a new splice box.

Q: What lifetime support can AFL offer?
A: SkyWrap is very reliable and requires very little maintenance during its life. However, where a customer requires the security of long term maintenance support, AFL offers a range of packages tailored to the size and type of SkyWrap link or network and the needs of the customer.

Support packages typically range from a guaranteed service response, including long term lease of specialist installation equipment with support from AFL Engineers to a simple spares stockholding arrangement. Condition assessment packages can be offered to provide regular reports on the condition of a SkyWrap link.

Q: Can SkyWrap be removed from the overhead line once it has been installed
A: Yes, SkyWrap can easily be removed using equipment provided by AFL. A special device is attached to the front of an installation tug, which moves along the host ground wire or phase conductor collecting the cable in front of the tug in loops. The cable, clamps and fittings are cut, unbolted or removed to leave overhead lines clean and unmodified by the SkyWrap installation and removal.

Q: What is the longest span length on which SkyWrap can be installed?
A: The current record span length is 2,234m (7,330ft) completed in Peru, December 2012.

Q: What is the tallest tower on which SkyWrap has been installed?
A: SkyWrap is installed on the 500kV double circuit line across the southern end of the Suez Canal in Egypt. The towers on either side of the canal are 221m (725ft) high to provide the necessary clearance for ships passing underneath.

Q: What is the steepest gradient that SkyWrap installation equipment can accommodate?
A: The 63kV line into Takamaka substation on Reunion Island in the Indian Ocean passes over a tall ridge. The tower at the top of the ridge is at 869m (2,851ft) above sea level. On one side there is a 1556m (5,105ft) span down to a tower at 596m (1,955ft) and on the other side a 996m (3,268ft) span down to 578m (1,896ft). A double-wrap - simultaneously wrapping 2 x 24-fibre cables - SkyWrap installation was carried out on this line in 2003. The shorter, steeper span has a gradient of 29% (about 1 in 3½) between towers, but the gradient of the conductors close to the top tower is much steeper than this.