1.0 Introduction:
The Telecommunication's market has revolutionized our ability to communicate, both in business and personally. Mobile devices are becoming our preferred method of communicating with each other. Mobile devices rely on a network of cell towers that track the users as they move from the transmission range of one tower to another. A telecommunication network relies on a network of cell towers. Many tower sites are fitted with a standby, or prime power generator to ensure power during a utility outage.

*This Information Sheet discusses the characteristics of Cell Tower loads, and how they influence the specification of a generator set being used on a cell tower, in both a standby and primary power application.* (Continued over)
There are many Federal, State and local codes that have to be considered when specifying a generator set, including:

- Equipment with remote monitoring systems that monitors all the vital operating parameters of the generator set.

Cell towers form part of a network that is controlled and monitored from a central location. Frequently the generator controls are not longer available. Transfer of the load will be via an ATS. The ATS will have delay start and stops timers to avoid the set starting and stopping frequently through periods of utility erratic supply.

The system engineer will specify the generator has to be started automatically when a sensor detects the primary power source is down. Prime power installations assume no utility supply, and will frequently have two generator sets supplying power running alternatively and acting as a standby power source should the running set fail. Remote installations usually are fitted with prime power systems. Prime power generator systems that have to run continuously through lengthy maintenance cycles are fitted with lubricating oil make-up systems. Transfer of power from set to the other is via an ATS, with the duty cycle from standby to prime power switching between the units.

A typical cell tower load ranges from 15 to 60 kW. The actual transmission equipment takes much less power, but the addition of air-conditioning, lighting and heating increases the overall site-load.

The prime mover selected can be influenced by any of the following factors:

- Site location - The ability to get fuel to the site. Natural gas is more available in urban areas, while propane and diesel can be stored in remote areas.
- Environment - Some local codes may put restrictions on bulk diesel tank storage.
- Fuel Storage - Diesel sets will be specified to have UL approved based mounted fuel tanks with sufficient capacity as set by the user. LPG tanks will be supplied also to code with sufficient capacity for LPG powered sets.

Cell tower sites typically are supplied to the following arrangement:

- Canopy - Sites with modules too small to accommodate the generator are fitted with enclosed generators sets.
- Set enclosures - The specifying engineer will have to consider noise codes acceptable in urban areas. Normally a weather protective enclosure is acceptable but in some urban areas the enclosure will have to be sound attenuated. If the site is remote considerations should be given to a winterization package including motorized louvers, and snow hoods.
- Foot Print - In urban areas where land values are high, the smallest footprint is recommended.
- Sub-Base - Most generator sets are fitted on a sub base with vibration isolators between the generator assembly and base. Extra vibration isolation may be required in sensitive areas, such as hospital installations.

The generator end of a generator set in a Cell Tower application should be specified to consider the following:

- Starting Loads - Starting electric motors can produce high starting skVAs. The system engineer will have to calculate if the generator AVR should be a PMG (Permanent Magnet Generator) to absorb voltage drop caused by motor loads.
- SCR Loads - Inverters, rectifiers and other transmission equipment can result in a higher percentage of SCR (Silicon Controlled Rectifier) loads. This can require higher capacity alternator ends and/or closer controlled AVR's to ensure the electrical output stays within the loads ability to absorb any harmonic distortion.

The system engineer will specify the generator has to be started automatically when a sensor detects the primary power source is not longer available. Transfer of the load will be via an ATS. The ATS will have delay start and stops timers to avoid the set starting and stopping frequently through periods of utility erratic supply.

Cell Towers form part of a network that is controlled and monitored from a central location. Frequently the generator controls are equipped with remote monitoring systems that monitors all the vital operating parameters of the generator set.

There are many Federal, State and local codes that have to be considered when specifying a generator set, including:

- EPA - In USA, emergency generators must comply with EPA exhaust emission regulations for stationary emergency generators with concession that earlier Tier engine models are acceptable (without exhaust after-treatment devices) due to low number of hours they will operate. However, any daily or other non-emergency duty of over 100 hours annually will require compliance with the latest EPA regulations.
- Any and all local or state ordinances including NFPA.