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ONLINE

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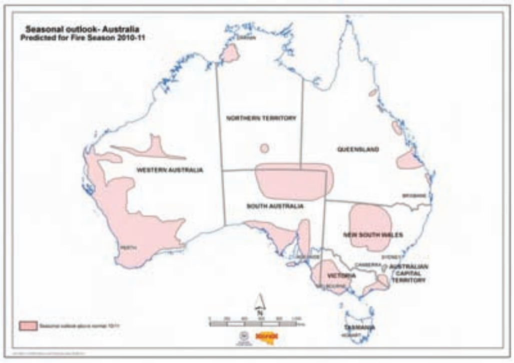
Quick Deployment Bushfire Emergency Weather Stations

10 October 2010 - Bushfire CRC Media Release

Scientists Map Bushfire Outlook for Australian Summer

A strengthening La Niña which brought above-average rainfall to much of eastern Australia from January to August means much of Queensland, eastern New South Wales and central Victoria can expect average fire potential this coming bushfire season. However, the fire potential in southwest Western Australia, southern South Australia and much of western Victoria will be above average



These are the consensus views of Bureau of Meteorology scientists and fire managers from around Australia, brought together by the Bushfire Cooperative Research Centre at separate sessions in Darwin and Melbourne to discuss the outlook for the 2010-11 fire season.

The accompanying map shows the main areas of expected above-average fire potential in pink, with the main areas of average potential in white.

The WeatherHawk 520

Wireless Solid State Weather Station

Fire professionals need powerful, portable technologies to assist in making strategic decisions in times of emergency, for resource planning and for scheduled fire management programs. Campbell Scientific Australia offers the **WeatherHawk 520** as a simple, quick monitoring and reporting solution that can be used in extreme environments to alert and notify of changing weather conditions. When bundled with a solar power supply, the 520 can work as a drop and run, back-to-base weather station, perfect for multiple placements when real time reporting is paramount.

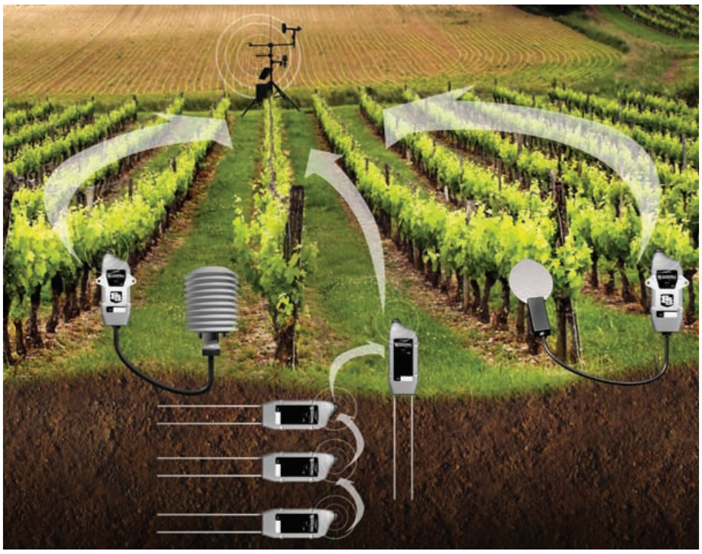
The WeatherHawk 520 weather station measures **wind speed & direction**, **barometric pressure**, **solar radiation**, **rainfall**, **air temperature & relative humidity**. This rugged sensor system has no moving parts and includes an integral data logger, 3AHr battery pack & wireless 922 MHz spread spectrum radio. Accessories include a mast adapter for masts from 1.75-2.0 " ID, a wireless base station with power supply & antenna.

- Quick and easy to setup
- A portable weather station in around 5 minutes.
- Perfect for fire professionals, prescribed burning and rapid response.
- No extra equipment required
- No specialist training required
- Wireless connectivity
- Built for extreme conditions
- Low maintenance
- Smart power management
- Cost effective

The **Weatherhawk 520** communicates to a host device (PC or server) using fully integrated industrial grade 922 MHz spread spectrum RF communications technology. It also has an RS232 serial data I/O located on the bottom of the weather station which can be used as a second serial communications port for programming and testing the system, or for direct data downloads using a PC or PDA. For more information please contact Dave Boadle

Don't forget to check out our latest
video tutorials and product highlights on YouTube.
You'll also find videos explaining what you'll learn in our
Basic and Advanced CRBasic courses

WIRELESS SENSORS EXPAND MEASUREMENT POSSIBILITIES



It is particularly satisfying for us at Campbell Scientific when we develop technologies or products that benefit a large number of our customers. Because of this, we are excited to release our new wireless-sensor product line that allows sensors to be installed at a distance from the datalogger without connecting cables.

Freeing sensors from the location of the datalogger significantly expands the measurement possibilities in many applications, while at the same time simplifying installation and reducing costs. Networks of rain gauges can be scattered through a watershed as needed. Large numbers of strain gauges can more easily be interspersed on a structure. You can probably think of other scenarios where it would be useful to place a sensor several hundred meters away from the datalogger.

The new family of wireless products consists of the **CWB100** base station, the **CWS220** infrared radiometer, the **CWS655** soil-water-content sensor, and the **CWS900** configurable interface—a component that adds wireless functionality to a wide variety of sensors. The most significant benefits of the new product line are the wireless communication, small size of the components, the low cost, and the simplicity of setup. Wireless communication allows for placement of sensors without the worry, effort, and expense of laying cable to each measurement point. In many measurement setups, cables present a difficulty and can be expensive and labour intensive to install. Once installed, users may be inhibited from changing their configuration because of the time and effort already invested. Cables are also susceptible to damage from machinery, weather, and pests. Wireless sensors eliminate these problems.

Power concerns have been minimized by a low-power design that requires only two AA batteries (they can last a year with 15 minute sensor polls), and by a solar-power option that can stay charged with just three hours of light per day.
Another benefit is that the wireless sensors can be easily configured without complex programming and they can be integrated into full datalogger systems. The base station resides at the datalogger and polls the sensors via radio. Data can be relayed through a mesh network that uses as many as three hops—from one wireless sensor in the network to another. The base station stores the data until the datalogger requests it. While the path to the datalogger is wireless, the sensor data is the same as if each sensor was directly connected to the datalogger.

Here at Campbell Scientific, we are excited about the potential that these new wireless products hold. They are compact, use little power, and are rugged and weather-sealed. The sensor modules are each leak tested before shipping, and in real world testing they have withstood rain, snow, wind, and hail. Even when installed 3 ft below the canopy in a mature corn field, they were able to transmit up to 500 ft. The possibilities are very encouraging. Contact Campbell Scientific to see if these wireless networks can work for you.

Here are descriptions of each member of this new family of wireless sensors.

CWB100 Wireless Base Station

The base station is the master radio in the wireless network. It polls the wireless sensors (it can store data from up to 50 sensors) and passes the data to the datalogger when requested. It can connect to a PC for configuration, and communicates with the datalogger via serial protocol using a single control port. The base station uses a frequency-hopping, spread-spectrum radio in the 900-MHz range (other ranges available). These features give it longer range and less interference, so the radio can communicate with sensors over 1,000 ft away in optimal line-of-sight conditions. Data can be relayed up to three hops in a mesh network, since every wireless sensor can act as a relay node for other wireless sensors in the network.

CWS220 Wireless Infrared Radiometer

The CWS220 integrates Apogee's SI-111 infrared sensor with a radio in one compact body. It is used to sense infrared radiation from surfaces to calculate the surface temperature without physical contact.

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new products

New Technology Set For Release in 2011

We have some great new products set for release early in 2011. Here's a little taste of what's on the burner:

OBS500 - Turbidity Probe with Antifouling

The OBS500 combines a backscatter sensor (better at measuring high turbidity) with a second sidescatter sensor (better at measuring lower turbidity). This SDI-12 probe also uses digital processing.

The OBS500 incorporates several antifouling methods to ensure the accuracy of its measurements. It includes a patented shutter/wiper mechanism to protect and clean the optics.

CS658 and CS659 Reflectometers

These are the next generation of soil water sensors for use with the Hydrosense II display. These reflectometer sensors measure propagation time and signal attenuation. From these raw values, dielectric permittivity and volumetric water content are derived. Soil specific calibration is not required for most mineral soils.

CPEC200 Closed Path Eddy Covariance System

We're developing an integrated turn-key closed path eddy covariance flux system for measuring CO2, H2O and sensible heat flux.

The system will be integrated around a CR3000 datalogger with expansion capability to measure other sensors and telecommunications options.

NL200 Ethernet Module

The NL200 will largely replace the NL100 and will be available at a cheaper price. It will feature a lower current drain, faster ethernet and will be smaller and lighter.

CRS450 Water Level and Temperature Datalogger

The CRS450 combines the CS450 water level and temperature sensor with a built-in Campbell Scientific datalogger. Features will include; data retrieval through sealed USB connector, a minimum sample rate of 0.500 seconds, internal data collection memory of 4 mb.

HTML and Javascript - Web Services

A new web API for getting data. We've also created a new web version of the RTMC Run-time. By using our new Web Publisher, RTMC projects can be converted and published directly to our new CSI Web Server or to a compatible data logger like the CR1000. The web application can then be viewed directly in a browser.

Hydrosense II

The Hydrosense II adds a number of new features to the original hand held water content meter. The Hydrosense now includes onboard data storage to allow field measurements to be stored and transferred to computer via Bluetooth. This allows water content to be charted over time using the software provided or exported to CSV format for use in excel or to be added to a database. A GPS receiver has been added to the Hydrosense to store location information with each water content reading. This allows measurements to be grouped into "zones" to provide average water content for specific areas and then plotted over satellite imagery using Google Earth. A new graphical display provides an easy to use user interface and comprehensive data readouts.

Wireless Sensors cont.

CWS900 Wireless Sensor Interface

The CWS900 is particularly exciting to introduce because of the broad spectrum of measurements it can bring into these wireless networks. It is a radio with a sealed connector that can be attached to a variety of sensors. It can measure analog voltage and frequency, count pulses, and supply excitation voltage, making it compatible with many types of low-power sensors. The connector to attach the sensor to the wireless interface is a conventional type that can be specified when ordering sensors from Campbell Scientific. We will also offer the A150 terminal interface that allows one of your existing sensors with a pigtailed cable to attach to the connector on the CWS900.

CWS655 Wireless Soil-Water Sensor

This sensor has rods that insert into the ground to measure soil-water content, electrical conductivity (EC), & soil temperature. CWS655 wireless sensors can be spread out over a field and transmit the data to a base station in a secure location away from the field.

Reprint Courtesy of CSI

case study

Recently we sent Mr Dave Boadle down to the University of Western Sydney (Hawkesbury Campus) to assist with the installation of their new eddy covariance station. While the installation went off smoothly, a brief tour showed the extent of their use of our equipment. The Whole Tree Chambers and Rain Out Shelters use our CS616 and CR1000 loggers, while their greenhouses even have a trace gas analyser(TGA). With the eddy covariance system now added to their inventory they really are valued customers of Campbell Scientific Australia. Following is a case study of some of the valuable and exciting projects happening at this campus.

The Hawkesbury Forest Experiment - University of Western Sydney

In 2009, the University of Western Sydney received $40 million from the Australian government's Education Investment Fund (EIF) to establish a national facility for climate change and energy research (CCER) on the Hawkesbury Campus in Richmond, NSW. This new facility will house one of Australia's most comprehensive climate change programs by providing scientific infrastructure to conduct cell-to-ecosystem research, thereby generating information about the impact of climate change on biological function at numerous levels.

Whole-Tree Chambers

In 2006, UWS received 12 whole-tree chambers (WTCs) from Sweden (courtesy of Prof Sune Linder, Swedish University of Agricultural Sciences) for use at the Hawkesbury Forest Experiment (HFE). In 2007, a 2-year experiment was initiated to study the impact of elevated CO2 and summer drought on fast-growing Eucalyptus saligna. The WTCs comprise a field-based experimental tree chamber system designed to grow single trees up to 9 m tall in elevated atmospheric CO2, with the capacity to control air temperature and soil moisture. The unique attribute of the field-based WTCs is the capacity to simultaneously measure whole-tree fluxes of CO2 and water vapour. Whole system gas exchange may be measured continuously once the tree reaches about 2 m height. At that time, a plastic partition is installed around the tree stem that separates the above ground tree shoot from the below ground rhizosphere, thereby establishing separate measurements of carbon and water gas exchange for the two locations.

Investment from EIF has provided funding to improve the WTC system in the following ways:

(i) while controlling temperature very well to track ambient conditions *(to within ± 0.5 °C across the range from 0-40°C*, the ability to simulate climate warming during day and night was added by including 6kW heaters in each chamber;
(ii) cooling capacity of the chambers was improved to help reject heat under harsh conditions in summer (e.g., > 40°C); and
(iii) there is independent control of temperature and relative humidity (RH) so that vapour pressure deficit (D) may be controlled within each WTC; RH and D control is crucial in warming experiments to avoid confounding temperature and D effects on plant processes. In its current configuration, the WTCs are used to investigate the responses of plantation Eucalyptus trees to atmospheric CO2 for current CO2 +240ppm and +3°C warming to understand how reforestation and tree plantation efforts can cope with plantation forests under future climate change scenarios. Rising atmospheric CO2 has important ecological implications because the CO2 fertilisation effect has the potential to increase carbon assimilation and reduce water loss on a leaf- and whole-tree basis, thereby increasing water use efficiency. Alterations in the carbon and water balance in whole trees, and associated changes in nutrient cycling, microbial function and plant/insect interactions, may have profound effects on carbon and water cycles across forested landscapes.

Subsequently, this facility represents an opportunity to increase the scale of field-based elevated CO2 experiments in Australia using woody species, which previously encompassed trees reaching only a few metres tall.

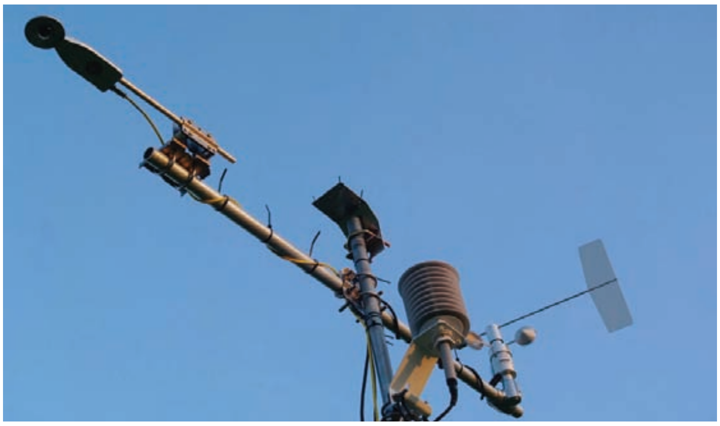
Rain-Out Shelters

UWS built six large, rain-sensing, automatic retractable roof rainout shelters (12m long x 8m wide x 7m tall) in the field; associated with each shelter is a control plot of equal size. Control and rainout shelter plots are exposed to the same natural environmental conditions except when rain events are excluded from the rainout shelter plots. The shelters are constructed of welded aluminium with mounted moisture (rain) sensors that can be set to different rainfall event size sensitivities. When rain is detected, transparent plastic curtains are automatically deployed and unrolled from the top of the peaked roof of the shelter; concertina curtains of the same material are expanded in three sections on each side of the shelter. A 1 m gap at the bottom of the rainout shelter is designed to maintain air flow from the outside environment into the shelter to minimize the impact of the curtain on the site microclimate. After the rainfall exclusion event, the curtains will be raised to their original fully retracted (i.e. rolled) position.

Rainwater will be collected on-site using a roof collection system, stored in a 220,000 L water reservoir and available for re-application to the shelter trees at the appropriate time. Partitions have been inserted into the soil (at the drip line of each shelter) to a depth of 1m to exclude lateral water flow from unsheltered locations. Tree seedlings will be planted into sheltered and unsheltered plots at equal planting densities and border trees will be planted to reduce wind-blown rainfall from reaching the experimental trees within each shelter. All plots have been extensively equipped with environmental sensors linked to data loggers to measure wind speed, relative humidity, air temperature, light, soil temperature, soil moisture, and soil water potential at different depths and locations. Environmental conditions will be continuously monitored throughout the duration of the experiment. Using this facility, UWS will conduct the first field-based precipitation manipulation experiment on trees in Australia in which we have the capacity to maintain natural variability in the amount of annual precipitation, but alter the timing and magnitude of seasonal precipitation (i.e. summer or winter) using rainout shelters to redistribute rainfall seasonally. In addition, they will use rain-out shelters to impose long drought periods on tree seedlings & saplings to assess the proximate physiological cause of mortality through hydraulic failure and/or carbon starvation.

Eddy Flux

In the Cumberland Plain woodland, UWS will establish an eddy covariance (flux) site to measure the exchange of CO_2 and water between the woodland vegetation and the atmosphere under natural environmental conditions. The vegetation at the site is dominated by Eucalyptus trees (ca. 20-25m tall) and an understorey comprising a wide range of species, but dominated by Bursaria, Melaleuca and C3 and C4 grasses. A 30m tower will be airlifted into the site, to avoid disturbance of the native vegetation, and then fitted with standard eddy covariance gear. They will measure canopy energy balance, as well as the turbulent fluxes of momentum, heat, water vapour and CO_2, which will require measurement of net radiation flux, soil heat flux, and heat storage in the soil and canopy. Protocols for flux measurements, data storage and processing will follow guidelines developed by the national Terrestrial Ecosystem Research Network (TERN) and OzFlux. Flux measurements will be complemented by standard plant growth, sap flux, soil respiration, and leaf-level gas exchange measurements to provide insight into the individual processes controlling ecosystem exchange of carbon and water.



LW/SW/Net radiometer, PPFD, RH%, Airtemp, windspeed & winddirection on top. On the ground, not visible: heatflux, leaf wetness, TDR, soiltemp & averaging soil-temp. The zip-ties keep the birds away

Conclusions

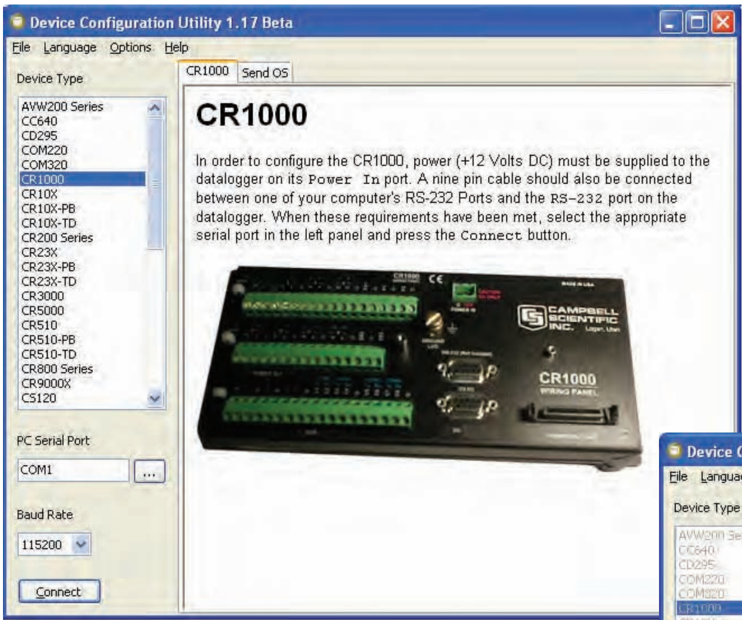
We are very fortunate that the Australian government and the University of Western Sydney have contributed significant financial resources to build this cell-to-ecosystem climate change facility. When it is completed, it will represent one of the largest facilities developed for climate change research in the Southern Hemisphere. They hope that scientists in Australia and around the world will join them in our research efforts to address one of the most significant issues of the Anthropocene era.

Kangaroos at the HFE

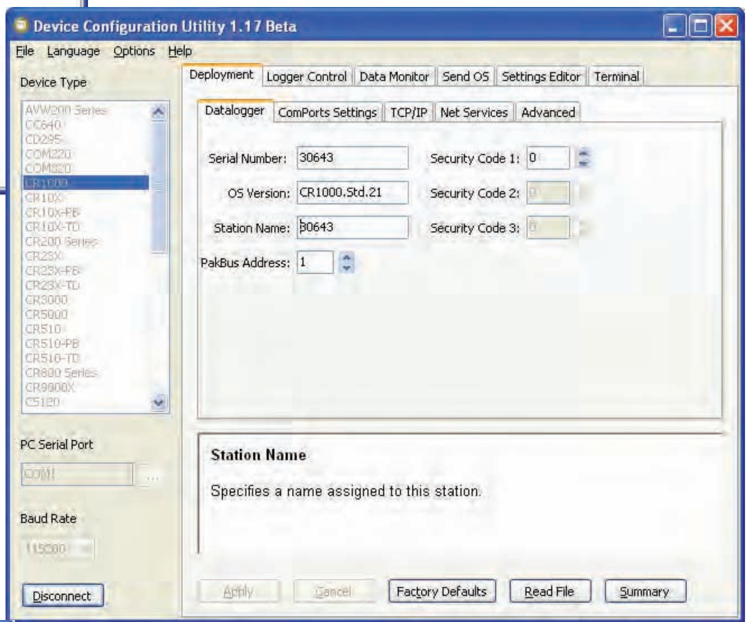
Case Study Courtesy of Professor David Tissue
Theme Leader Climate Change -Centre for Plants and the Environment
University of Western Sydney
Photos Courtesy of Markus Riegler

For more Information about Eddy Flux Systems
contact Dave Boadle

Saving/Reading Campbell Scientific Equipment Settings Using Device Configuration Utility

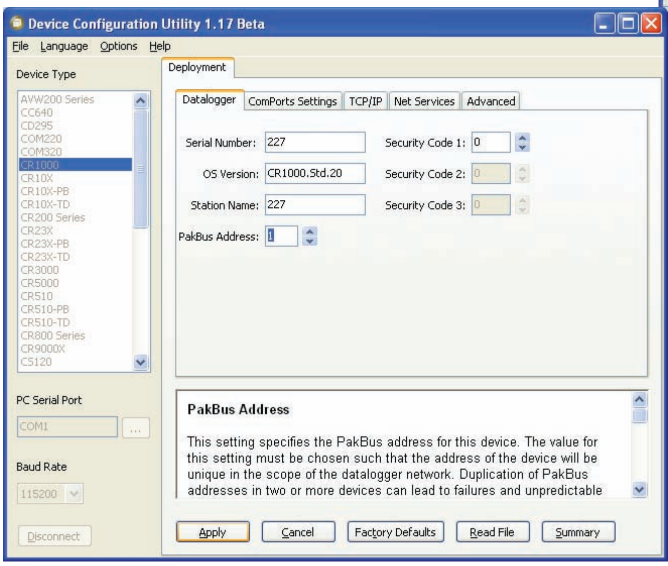


Device Configuration Utility (DevConfig) contains the ability to Retrieve (from logger), Save (to file), Read (from file) and Apply changes (to logger) the configuration settings of a wide range of Campbell Scientific data loggers, sensors and communications peripherals. This TechTip will focus on utilising these capabilities to 'backup' or even transfer (to another device) such settings.



Retrieve Settings From Equipment:

To Retrieve the current configuration of a device, just connect to it using DevConfig. During the connection process, the settings are automatically retrieved from the device.



Apply Settings To Equipment:

Once you have connected to the device, any change to settings will enable the "Apply" Button. Clicking the Apply Button will send the currently displayed configuration to the device.

NB: If you want to enable the apply button, but don't want to change any settings in your device, then change a setting to a new value, then set it back to its old value.

tech tip cont.

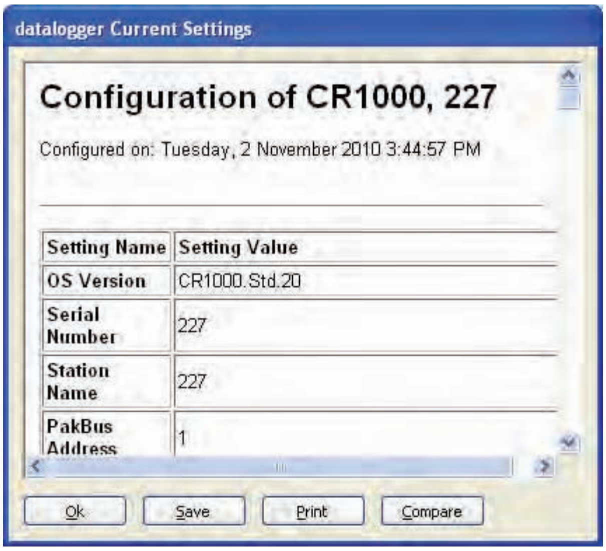
Save Settings To File:
When you ‘Apply’ settings to a device, or click on the ‘Summary’ button, a dialogue box appears with the settings you have just sent to the logger. This dialogue box enables the user to

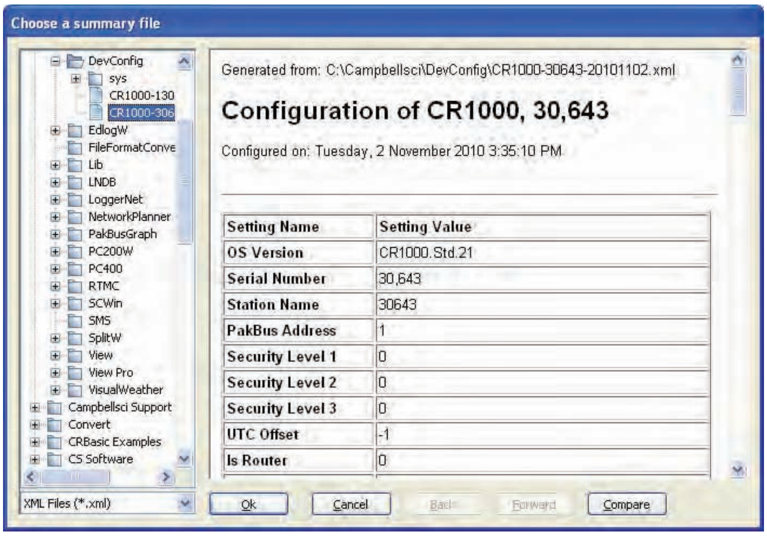
-**‘Save’** – Saves an XML document which holds all the settings for that device

-**‘Print’** – User can print the settings which were just applied to a station

-**‘Compare’** – Compare the currently saved settings with those of a previously saved XML file

Read Settings From File:
Once you have connected to a device, you can click on the ‘Read’ button to read the configuration from an XML file previously saved. This loads to the current display all the settings which were set in the display when the XML file was saved previously (except for Serial Numbers & OS Version). You can ‘Apply’ these changes to update the data logger with the settings ‘read’ from the file.





Whether you are upgrading your Data Logger’s operating system, setting up a new network, or you’ve just read this Tech Tip and are keen to backup the settings for your Campbell Scientific network(s)/system(s)/device(s); The ‘Save’, ‘Read ‘ and ‘Apply’ functionality of DevConfig provides a useful, timesaving aid in the documenting of equipment setup/configuration.

Signal Availability Info For Modems

DCP NEXT-G Modem

Band	850/2100MHz
Band GSM/GPRS/EDGE	Not Supported
Carriers Supported in Australia	Telstra 3G 850MHz (Next-G) Optus 3G 2100MHz Hutchison 3G 2100MHz Vodafone 3G 2100MHz

DCP GSM Modem

Band	900/1800MHz
Carriers Supported in Australia	Telstra GSM 900/1800MHz Optus GSM 900/1800MHz Vodafone GSM 900/1800MHz

You can find the signal availability in your site from the following links.

Telstra
http://www.telstra.com.au/mobile/networks/coverage/maps.cfm

Optus
http://www.optus.com.au/coverage

Vodafone
http://www.vodafone.com.au/personal/services/coverage/maps/index.htm