ACTIVE ANTENNA

SYNCHRONIZATION PROCEDURE

Active Antenna Synchonization Procedure

Part Number 810412Z Rev. 1

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Vitec Group Communications

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DECTSYNC

ACTIVE ANTENNA SYNCHRONIZATION PROCEDURE

This document describes how to eliminate phase differences from Active Antenna DECT Sync signals. Each Active Antenna connected to a matrix or base station must have their DECT timeslots synchronized. This is achieved by means of a 100Hz sync signal that is generated by the E-Que card or base station and transmitted via the CAT5 cable, as shown in Figure 1-1.

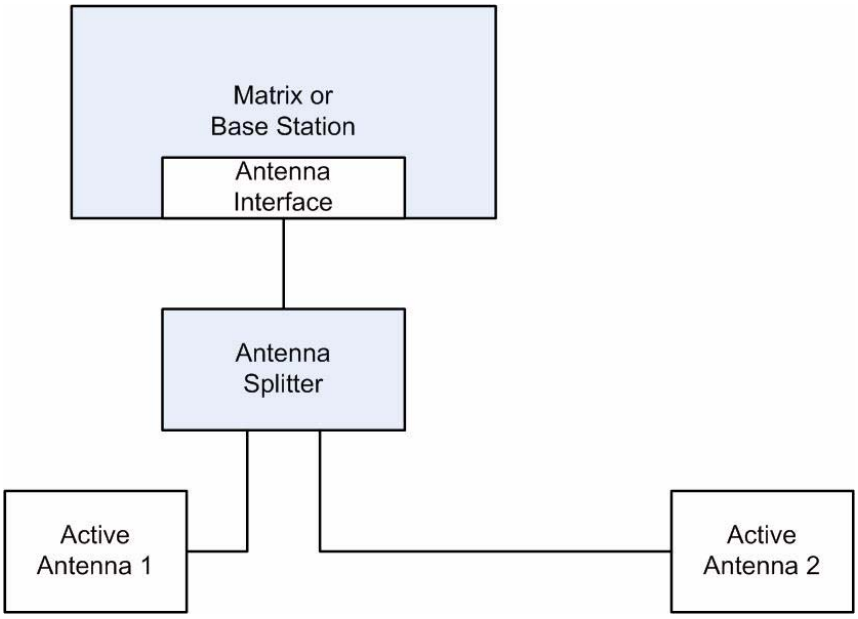

Figure 1-1: Active Antennas Connected to Base Station or Matrix

If the cable connecting Active Antenna 2 to the splitter is substantially longer than the cable connecting Active Antenna 1 to the splitter, then the DECT sync signals could be sufficiently out of phase to cause handover problems. This is due to the propagation delay of the Sync signal through the cable. If the Active Antennas are far enough apart (325ft/100m), then this is not a problem, but if they are located quite close to each other then it could result in handover difficulties.

Although the DECT sync values are expressed in terms of cable length, in fact these parameters actually compensate for the different propagation times of each cable - that is the length of time that it takes a pulse to travel from one end of the cable to the other. A number of factors can affect this. The length of the cable is one of them; others might include the impedance of the cable, the characteristics of the connectors etc.

The reason why it is possible to have a zero length in the cable length entry is because these parameters, when derived using the DECT sync procedure, are offsets rather than absolute values, measured relative to one reference cable / antenna. So the antenna that the DECT sync procedure uses as its baseline, and any other antennas with similar propagation times, will all appear to have a zero cable length, as the pulse delay will be the same for all of them.

This also explains why the length parameter can be increased beyond the maximum cable length specified in the manual. The physical characteristics of the cable may mean that its propagation delay is much longer than might be expected from its physical length alone.

The following equipment is required to carry out the Active Antenna Synchronization procedure:

1. MK II Beltpack to allow communication with the DECT sub-system, as described in the procedure. Beltpack must have v.17_K19 or later of DECT firmware.
2. PC/Laptop/Notebook running DECTSync Application.
3. Serial Cable to connect the beltpack to the laptop.
4. ECS V4.2 or later if using an Eclipse rack.
5. Omega/Median rack code 11.20 or later if using an Eclipse Omega or Median rack.
6. E-QUE application code v1.0 or later if using an Eclipse Omega or Median rack.

MEASURE ACTIVE ANTENNA SYNCS

The procedure below outlines how to use a beltpack and the DECTSync utility to test the active antennas and obtain DECT synchronization data to input into ECS or the Configuration Editor. The synchronization data is presented by the DECTSync utility as cable lengths as a means of expressing the overall propagation delay.

1. Get a list of all Active Antennae from ECS or the CellCom/FreeSpeak Configuration Editor with their port numbers.
2. Obtain a map of the site and mark the location of each Active Antenna.
3. Set all the antenna cable length values to zero in ECS (Eclipse matrix) or the Configuration Editor (Cellcom/FreeSpeak).
4. Download a new map with the antenna cable lengths set to zero to the matrix or base station and perform a reset to load the new values.
5. Connect a beltpack serial upgrade cable between the laptop's serial port and the test Beltpack. If a serial port is not available on the laptop, use a USB to serial converter. The pinout for this cable is given in Figure 1-3 on page 1-14 of this manual.

6. Start the DECTSync program and select the relevant serial/COM port.
7. Switch on the test Beltpack while holding down the right-hand scroll/menu key. The DECT survey mode screen should be displayed after the beltpack has connected to the basestation (Figure 1-2 below).

Figure 1-2: Beltpack Connection Status Information

Note: If the beltpack does not enter "site survey" mode (for example because no serial cable is present) press the right front-panel scroll button again with the beltpack still switched on. The beltpack will then be forced into "site survey" mode.

8. Beltpack Connected…", should be displayed in the lower left corner of the DECTSync window within a few seconds. If "Attempting To Connected To Beltpack…" continues being displayed, then switch off the Beltpack and start again from step 5. If that fails, check that the correct serial port has been selected and that the everything is plugged in properly.
9. Once a connection has been established between the Beltpack and DECTSync, the Sync Grid should start being populated, assuming that a connection has been established to an Active Antenna.
10. Walk around the site, ensuring that you connect to every Active Antenna where possible. At the very least the number of rows and columns in the grid should match the number of Active Antennae on site.
11. Generate a DECTSync report via the Tools->Generate AA Cable Length Report… menu.

Note: If the DECTSync procedure is carried out more than once ensure that the site survey is always started from the same antenna each time otherwise the cable lengths may differ between reports.

12. Update ECS or the Configuration Editor with the Active Antenna cable length information.
13. Download the new map to the matrix or base station and perform a reset to load the new values.
14. Repeat steps 5 to 9, ensuring that all the phases shown in the Sync Grid are between -9 and +9 or the effective cable length is 845ft (260 meters) or less.

DECTSYNC OPERATION

The main DECTSync window displays the relative Active Antenna phase grid. In the grid shown below, the Active Antennae detected are RPNs (Radio fixed Part Identifier) 24, 25, 26, 27 & 28. The RPN can be displayed in Hexadecimal or Decimal, via the Options->RPN Display Base menu item.

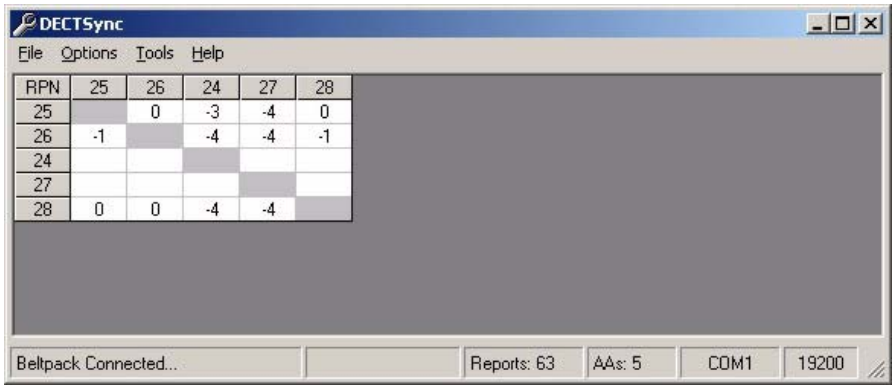

Figure 1-3: DECTSync Grid

The values shown in the grid can be in RFPS units, Active Antenna Sync units or in Metres and are selected via the Options->Display Format menu item.

RFPS UNITS

The values returned in the DECT module's Radio Fixed PartS report. These are the highest resolution units available. Each unit is equal to about 29 metres.

ACTIVE ANTENNA SYNC UNITS

The values used to initialize the Fixed Part DECT module in the Active Antenna. An AA Sync unit is equal to a RFPS unit divided by 4.5. Each unit is equal to about 130 metres.

METRES

The effective length of CAT5 cable between the E-QUE Card or Base Station or Antenna Splitter and the Active Antenna. Each 130 metre step is equal to 4.5 RFPS Units or 1 Active Antenna Sync Unit.

The grid shows relative phase offsets between Active Antennae. Each row displays the relative phases of the Active Antennae detected while the Beltpack is connected to the Active Antenna with RPN indicated in the left hand column. For example, when connected to Active Antenna 25, Active Antennas 24, 26, 27 & 28 were detected. Active Antenna 25 is -3 out of phase with respect to Active Antenna 24. This means that Active Antenna 24's effective cable length is about 78 metres longer

than that of Active Antenna 25. Blank cells indicate that no readings have been obtained. Cells are grey where Active Antenna RPNs intersect.

The status bar is displayed at the bottom of the DECTSync window.

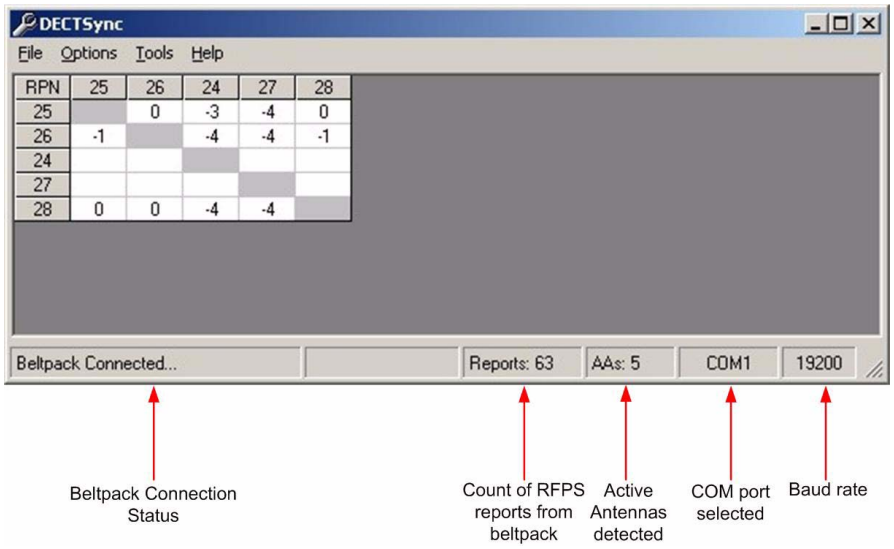

Figure 1-4: DECTSync Status Bar

The first panel from the left shows the connection status of the test Beltpack. If "Attempting To Connect To Beltpack..." is displayed, then DECTSync is waiting for a test Beltpack to be connected to the selected serial/COM port. DECTSync must be started before switching on the test Beltpack. Once communications have been established with the test Beltpack, "Beltpack Connected..." is displayed. The third panel shows the number of live RFPS reports received from the Beltpack. RFPS have don't have any information regarding neighboring Active Antennae are not included in this count. The fourth panel displays a count of the number of Active Antennas detected so far. The fifth panel displays the COM port currently selected. The sixth panel displays the baud rate, which should always be 19200.

The second panel from the left indicates if the RFPS reports are being logged to file or not. Logging can be controlled via the Tools->Log Data To File menu.

The beltpack Site Survey Information Connection screen displays the RPN (item 6) of the Active Antenna the test Beltpack is currently connected to, as shown below.

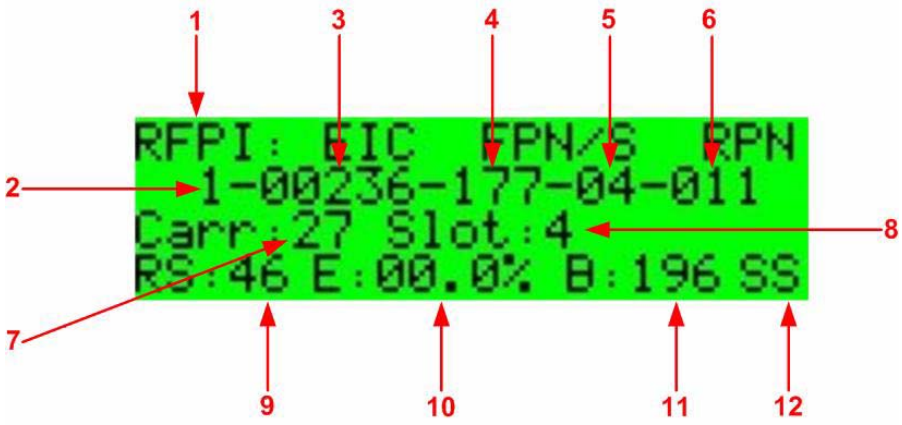

Figure 1-5: Site Survey Information Screen

A full description of all the fields is given in Table 1-1 below.

Table 1-1: Connection Information

Item	Description
1	Radio Fixed Part Identifier. This title refers to the whole of the second line of text. The RFP is the Radio Fixed Part to which the Beltpack is currently connected. (Much of this line of text is not unique to one Active Antenna.)
2	This is the PARK (Primary Access Rights Key) number (reserved for future use.)
3	The abbreviation stands for Equipment Installer Code and the number on the second line is the EIC number.
4	Fixed Part Number. This and item 6 below are unique to the particular Active Antenna.
5	Fixed Part Sub-Number. This is effectively the system number which identifies which matrix the Beltpack is registered with.
6	Radio Fixed Part Number. This is the identifier of the Active Antenna on the system.
7	Carrier Number (both Active Antenna and Beltpack)
8	Timeslot Number (used by Active Antenna)
9	Received Signal strength Indication (digital indication). This is an arbitrary number in the range 0-52 and, therefore, significant only in the context of a particular installation.
10	Block error rate for received frames.

Table 1-1: Connection Information

Item	Description
11	Raw battery level indication.
12	DECTSync survey mode indication. ***Note: Due to screen resolution only one 'S' may be visible.***

MENU ITEMS

Select COM Port

Select the COM Port that the Beltpack will be connected to. The baud rate is always 19200 for a CellCom/FreeSpeak Beltpack.

Clear Sync Grid & Results

Clear the Sync Grid and all the results collected so far. This option is only enabled once a connection to the test Beltpack has been established.

Clear Sync Grid & Force Beltpack Search

Clear the Sync grid and all the results collected so far, then put DECTSync in the state where it can detect that a Beltpack has been switched on. This option can be used when the Beltpack is disconnected from the laptop. This option is only enabled once a connection to the test Beltpack has been established.

Clear Sync Data Log

Clear the log box. This option is only enable if the Display Log option is set to on. It does not affect the data that is logged to file.

Display Log

Select whether to display the raw phase data reported by the Beltpack or not. If On is selected, then a text box is displayed in the lower part of the main DECTSync window. Sync data points are displayed along with timestamps, in the form:

16/03/2005 15:05:13, 25->27=4

This reading means that while the test Beltpack was connected to the Active Antenna with RPN 25(Decimal), AA with RPN 27 was detected with a relative phase of +4. This means that AA 27's effective cable length is about 104 metres shorter than AA 25's. These raw readings are noisy, so the values displayed in the grid are averaged.

Display Format

Select the display format to be used in the main grid.

RFPS Units

The values returned in the DECT module's Radio Fixed PartS report. These are the highest resolution units available. Each unit is equal to about 29 metres. These are the units shown in the log.

Active Antenna Sync Units

The values used to initialize the Fixed Part DECT module in the Active Antenna. An AA Sync unit is equal to a RFPS unit divided by five. Each unit is equal to about 130 metres.

Metres

The effective length of CAT5 cable between the E-QUE Card / Antenna Splitter and the Active Antenna. Each 130 metre step is equal to 5 RFPS Units or 1 Active Antenna Sync Units.

RPN Display Base

Select whether to display the Active Antenna RPN number in Hexadecimal or Decimal. The RPN is displayed in decimal in the Beltpack's Connection Information screen.

Display FPS

Select whether to display each Active Antenna's FPS number (1-15) along with in RPN in the grid.

View Debug

Select whether to open a separate window to display the raw RFPS reports from the DECT stack.

Log Data To File

This option allows all the raw data points reported by the Beltpack to logged to an ASCII text file.

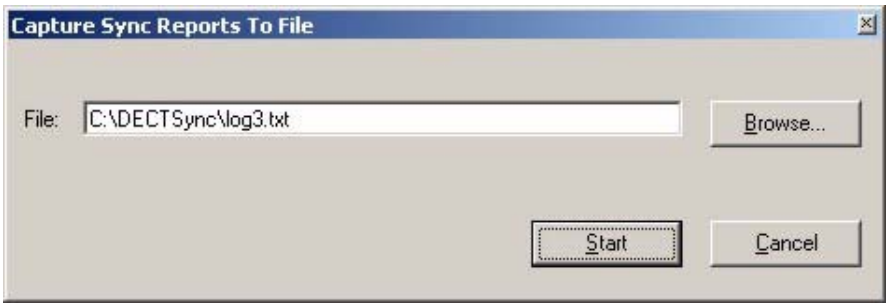

Figure 1-6: DectSync Logfile Dialogue

Click Start to begin logging to the specified file. Logging can now be Paused, Resumed or stopped via the Tools->Log Data To File menu.

Generate AA Cable Length Report

A HTML formatted report is generated, displaying the calculated effective Active Antenna cable lengths, which can be entered into ECS or the CellCom/FreeSpeak Configuration Editor. The Active Antenna relative Sync results grid is also included in the report.

The window shown below is displayed, allowing various details to be entered as well as the filename. The site name, tester's name and miscellaneous notes are included in the report. If the "Show Report" box is checked, then the report is automatically displayed in the default web browser.

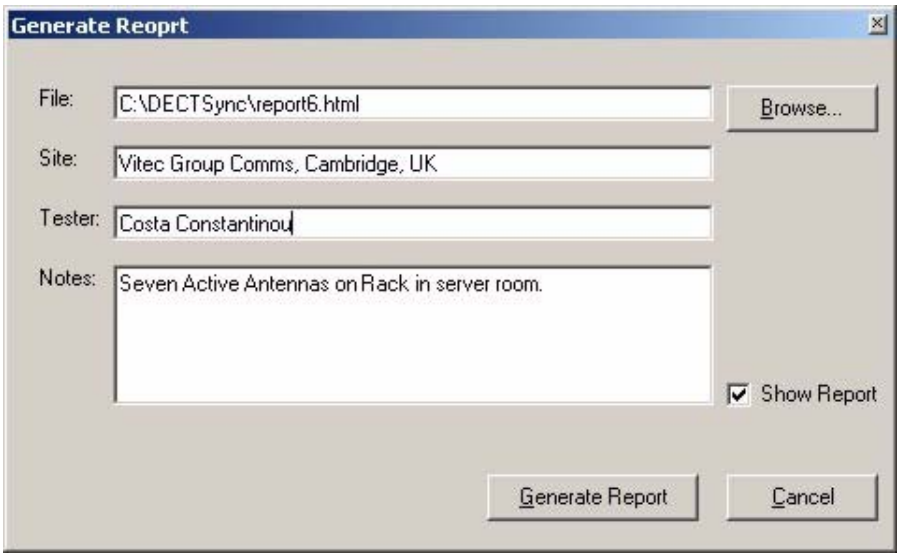

Figure 1-7: Report Generator

Converter

Selecting this option opens the window shown below.

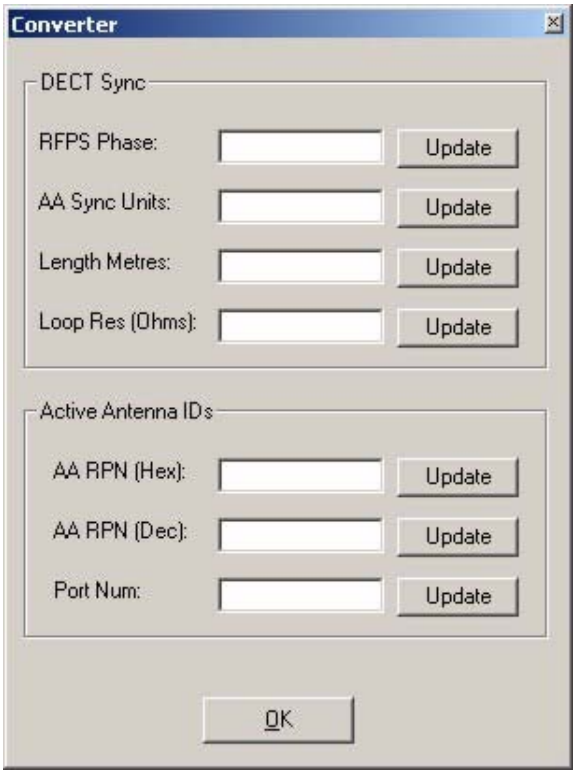

Figure 1-8: Unit Converter Screen

To convert between the various units, simply enter the value and press enter or click the relevant update button.

DECTSYNC INSTALLATION

To install the DECTSync program:

Navigate to the DECTSync folder under “3rd_Party_Software\Wireless System PC Tools\DECT\DectSync v1.1.0’ on the Eclipse system software distribution CD (part no. 750013Z) or ‘Firmware\PC Tools\dect\Dect_Sync\DectSync v1.1.0’ on the CellCom system CD (part no. STA0410CC) or the FreeSpeak system CD (part no. STA0410FS).

Run the file ‘Setup.exe’ in the folder to start the installation. The DECTSync setup screen is displayed.

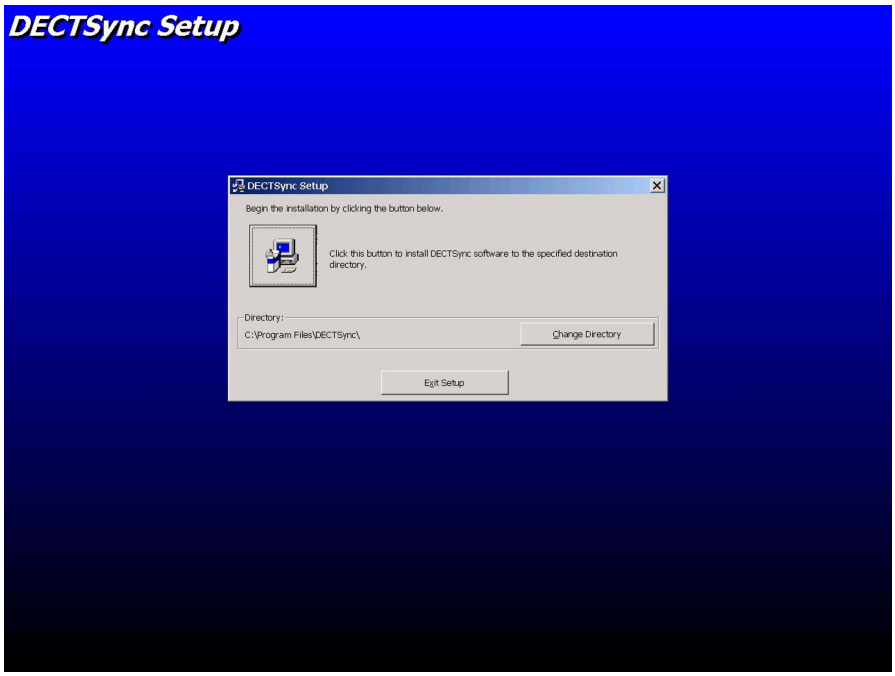

Figure 1-9: DECTSync Installation Setup Screen

Use the ‘Change Directory’ button to browse to a different directory to the default if required. It is recommended that the default directory is accepted.

Click on the Install button to start the installation. The installer will check the available disk space.

Figure 1-10: DECTSync Setup

If sufficient disk space is available (around 700K) the installer will display a list of available program groups. This is the program group DECTSync will be placed in under the 'Programs' menu.

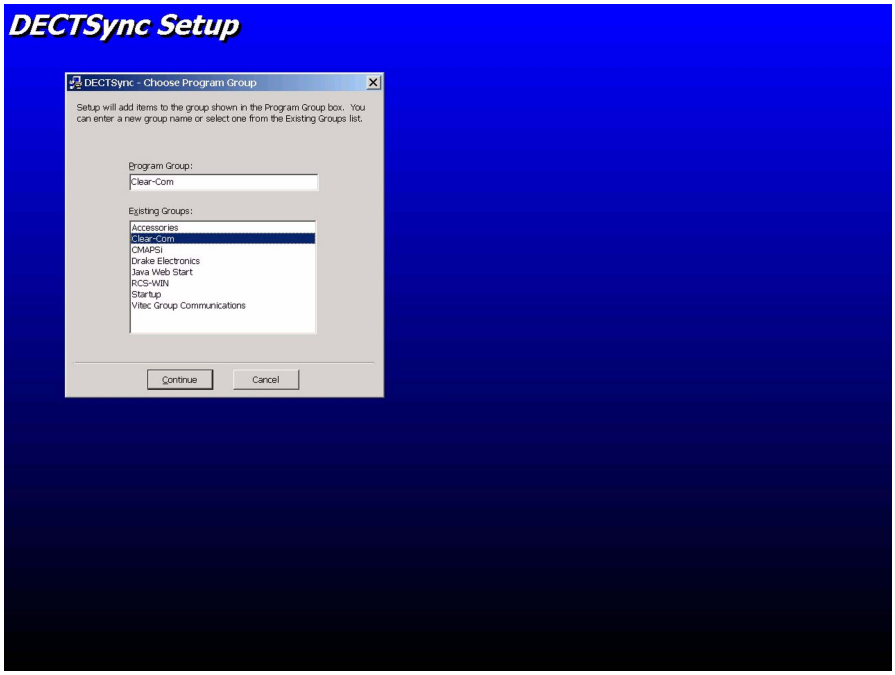

Figure 1-11: Select Program Group

It is recommended that the Clear-Com group is selected if it already exists. Alternatively a new program group name can be typed into the program group field. Once the program group has been selected click on the 'Continue' button.

The DECTSync files will be copied to the destination directory and the installer will display an installation progress screen.

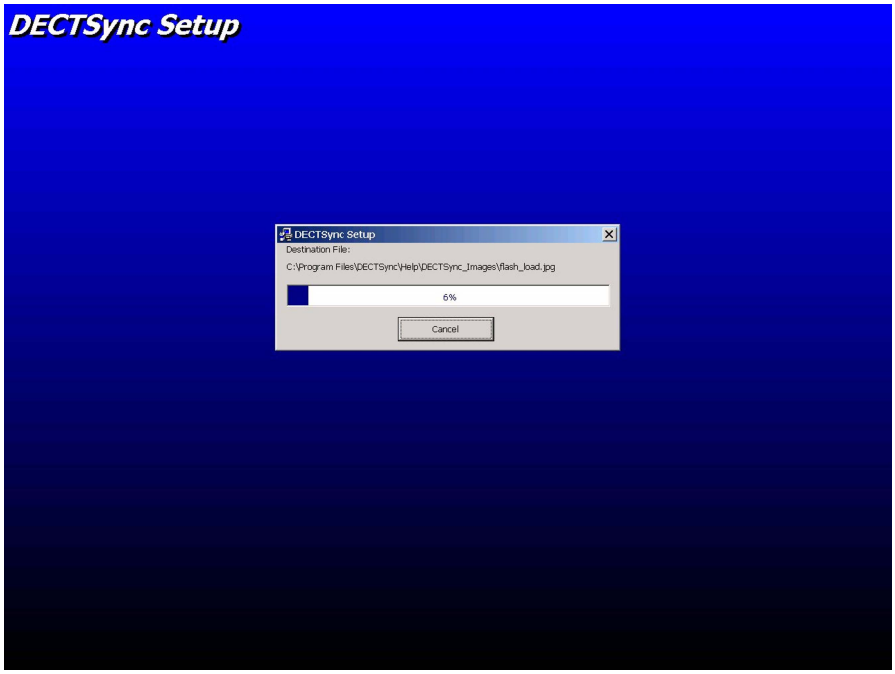

Figure 1-12: DECTSync Installation Progress

When the installation is complete the installer screen will close. The DECTSync program is now ready to be run.

CABLE PINOUTS

BASE STATION PROGRAMMING SERIAL CABLE PINOUT

Standard Null-modem cable with data Send and Receive crossed over.

PC Connection usually 9 way Female D-type connector	Base station connection 9 way Male D type connector
1	N/C
2	3
3	2
4	N/C
5	5
6	N/C
7	N/C
8	N/C
9	N/C

Table 1-2: Null-Modem Cable Pinout

BELTPACK PROGRAMMING SERIAL CABLE PINOUT

PC Connection usually 9 way Female D-type connector	Beltpack connection 3.5mm Stereo jack plug
1	N/C
2	Tip
3	Ring
4	N/C
5	Screen
6	N/C
7	N/C
8	N/C
9	N/C

Table 1-3: Beltpack Programming Serial Cable Pinout

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         (4) UHF WBS Analog wireless intercom systems have a Limited Warranty of three years.

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ii) Direct Sales: The Standard Warranty Period will commence from the date the product was shipped from Clear-Com to the Customer. The Standard Warranty Period start date for contracts that include commissioning will be the date of the Site Acceptance Test (SAT) or one month from conclusion of the commissioning project, whichever is earlier.

f) Invalidation of Warranty

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g) Software Updates

i) Software Updates are released periodically to correct discovered program bugs. During the Warranty Period, software updates are available to Customers free of charge.

h) Software Upgrades

i) Software Upgrades include new Features and/or Functional Enhancements and are not included as part of the Standard Warranty but may be purchased at the published rates.

ii) Note: In the absence of a Software Update containing a program correction and no available workaround to mitigate the problem, at the discretion of Service, Sales, Engineering, or Product Management, the Customer may be provided a Software Upgrade under warranty.

2. **Exclusions.** Services do not cover damage or failure caused by any occurrence beyond Clear-Com's reasonable control, including without limitation acts of God, fire, flooding, earthquake, lightning, failure of electric power or air conditioning, neglect, misuse, improper operation, war, government regulations, supply shortages, riots, sabotage, terrorism, unauthorized modifications or repair, strikes, labor disputes or any product failure that Clear-Com determines is not a result of failure in the Services provided by Clear-Com. Further Services excluded from this Agreement include: services required due to errors or omissions in Customer purchase orders; installation or maintenance of wiring, circuits, electrical conduits or devices external to the products; replacement or reconditioning of products which, in Clear-Com's opinion cannot be reliably maintained or properly serviced due to excessive wear or deterioration; Customer's failure to maintain the installation site in accordance with the environmental specifications of the products; or service on products removed from the location originally specified by Customer and/or reinstalled without the prior written approval of Clear-Com. Customer will pay Clear-Com's then current published charges to restore such Covered Products to a condition eligible for further service under this Agreement. Clear-Com shall be excused from and shall not be liable for any failure or delay in performance under this Agreement due to the foregoing or any causes beyond its reasonable control.

3. **Limitation of Liability. IN NO EVENT WILL CLEAR-COM BE LIABLE UNDER THIS AGREEMENT FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING WITHOUT LIMITATION LOST PROFITS), REGARDLESS OF THE FORM OF ACTION, EVEN IF ADVISED IN ADVANCE OF THE POSSIBILITY OF SUCH DAMAGES.**

4. **Assignment.** Neither party may assign this Agreement or any portion thereof without the prior written consent of the other, except in the event of a merger, sale of all or substantially all of the assets or other corporate reorganization.

5. **Ownership of replaced parts or product.** All replaced parts or products become the property of Clear-Com.

6. **Entire Agreement.** This Agreement constitutes the entire agreement between the parties with respect to the subject matter hereof, and supersedes all prior or contemporaneous proposals, oral or written, and all other communications between them relating to the subject matter of this Agreement.

TECHNICAL SUPPORT & REPAIR POLICY

NOVEMBER 1, 2008

In order to ensure that your experience with Clear-Com and our World Class products is as beneficial, effective and efficient as possible, we would like to define the policies and share some "best practices" that can accelerate any problem solving processes which we may find necessary and to enhance your customer service experience. Our Technical Support, Return Material Authorization, and Repair Policies are set forth below. These Policies are subject to revision and constantly evolve in order to address our Customers' and the Market's needs. Accordingly these are provided by way of guidance and for information only and may be changed at anytime with or without Notice.

TECHNICAL SUPPORT POLICY

a) Telephone, online, and e-mail technical support will be provided by the Customer Service Center free of charge during the Warranty Period.

b) Technical support will be provided free of charge for all software products under the following conditions:

i) The application, operating, and embedded software is installed on a product covered by Clear-Com's Limited Warranty, and:

(1) The software is at the current release level; or,

(2) The software is one (1) version removed from current.

ii) Older versions of software will receive "best-effort" support, but will not be updated to correct reported bugs or add requested functionality.

c) For Technical Support:

i) North and South America, (inc. Canada, Mexico, and the Caribbean) & US Military:

Hours:	0800 - 1700 Pacific Time
Days:	Monday - Friday
Tel:	+1 510 337 6600
Email:	CustomerServicesUS@vitecgroup.com

ii) Europe, the Middle East and Africa:

Hours:	0800 - midnight Central European Time

Days: Monday - Friday
Tel: +49 40 853 999 700
Email: TechnicalSupportEMEA@vitecgroup.com

iii) Asia-Pacific:
Hours: 0800 - 1700 Pacific Time
Days: Monday - Friday
Tel: +1 510 337 6600
Email: CustomerServicesAPAC@vitecgroup.com

d) Email Technical Support is available for all Clear-Com branded products free of charge for the life of the product, or two years after a product has been classified as obsolete, whichever comes first.

e) Support for Distributor and Dealer Sales

i) Distributors and Dealers may utilize the Customer Service Centers once a system has been installed and commissioned. Clear-Com Systems and Applications Engineers will provide support to the Distributor from the pre-sales stage through to satisfactory installation for new system purchases. Customers will be encouraged to contact their Dealer or Distributor with their installation and technical support enquires rather than using the Customer Service Centers directly.

f) Support for Direct Sales

i) Customers may utilize the Customer Service Centers once a system has been installed and commissioned by Clear-Com Systems and Applications Engineers, or in the case of project installations, once the Project Team has completed the hand-over to the Support Centers.

RETURN MATERIAL AUTHORIZATION POLICY

a) Authorizations: All products returned to Clear-Com or a Clear-Com Authorized Service Partner must be identified by a Return Material Authorization (RMA) number.

b) The Customer will be provided with an RMA number upon contacting Clear-Com Sales Support as instructed below.

c) The RMA number must be obtained from Clear-Com via phone or email prior to returning product to the Service Center. Product received by the Service Center without a proper RMA number is subject to return to the Customer at the Customer's expense.

d) Damaged equipment will be repaired at the Customer's expense.

e) Returns are subject to a 15% restocking fee.

f) Advance Warranty Replacements (AWRs);

i) *During the first 30 days of the Standard Warranty Period:* Once the equipment fault has been verified by Clear-Com or its authorized representative, Clear-Com will ship a new replacement product. The Customer will be provided with an RMA number and be required to return the faulty equipment within 14 days of receipt of the replacement or will be invoiced for the list price of a new product.

ii) *During days 31-90 of the Standard Warranty Period:* Once the equipment fault has been verified by Clear-Com or its authorized representative, Clear-Com will ship a like-new, fully refurbished replacement product. The Customer will be provided with an RMA number and be required to return the faulty equipment within 14 days of receipt of the replacement or will be invoiced for the list price of a new product.

iii) To obtain an RMA number or request an AWR:

(1) North and South America, Asia-Pacific, and US Military:

Hours:	0800 - 1700 Pacific Time
Days:	Monday - Friday
Tel:	+1 510 337 6600
Email:	SalesSupportUS@vitecgroup.com

(2) Europe, the Middle East and Africa:

Hours:	0800 - 1700 GMT + 1
Days:	Monday - Friday
Tel:	+ 44 1223 815000
Email:	SalesSupportEMEA@vitecgroup.com

iv) Note: AWRs are not available for UHF WBS Analog wireless intercom systems. UHF WBS Analog wireless intercom systems out-of-box failures must be returned to Alameda for repair.

v) Note: Out-of-box failures returned after 90 days will be repaired and not replaced unless approved by Clear-Com Management.

vi) Note: AWRs are not available after 90 days of receipt of product unless an AWR Warranty Extension is purchased at the time of product purchase.

vii) Note: Shipping charges, including duties, taxes, and insurance (optional), to Clear-Com's factory is the responsibility of the Customer. Shipping AWRs from Clear-Com is at Clear-Com's expense (normal ground or international economy delivery). Requests for expedited shipping (E.g. "Next-Day Air") and insurance are the responsibility of the Customer.

REPAIR POLICY

a) Repair Authorizations: All products sent to Clear-Com or a Clear-Com Authorized Service Partner for repair must be identified by a Repair Authorization (RA) number (see above).

b) The Customer will be provided with an RA number upon contacting Clear-Com Customer Services as instructed below.

c) The RA number must be obtained from Clear-Com via phone or email prior to returning product to the Service Center. Product received by the Service Center without a proper RA number is subject to return to the Customer at the Customer's expense.

d) Return for Repair

i) Customers are required to ship equipment at their own cost (including transportation, packing, transit, insurance, taxes and duties) to Clear-Com's designated location for repair.

(1) Clear-Com will pay for the equipment to be returned to the Customer when it is repaired under warranty.

(2) Shipping from Clear-Com is normal ground delivery or international economy. Requests for expedited shipping (E.g. "Next-Day Air") and insurance are the responsibility of the Customer.

ii) **Clear-Com does not provide temporary replacement equipment ("loaner") during the period the product is at the factory for repair.** Customers should consider a potential prolonged outage during the repair cycle, and if required for continuous operations purchase minimum spare equipment required or purchase an AWR Warranty Extension.

iii) No individual parts or subassemblies will be provided under warranty, and warranty repairs will be completed only by Clear-Com or its Authorized Service Partners.

iv) Customers requesting a non-warranty repair will be provided an estimate of the total repair cost prior to the return of the equipment. In the event that Clear-Com is unable to estimate

the cost of repair, the Customer may elect to return the product to the factory for an estimate. The Customer is responsible for shipping costs both to and from the factory in the event they choose not to accept the estimate.

v) The Customer must provide either a purchase order for the repair work, or will be required to make an advance payment (as a debit against the Dealer's line of credit, or credit card) prior to the repaired product being returned to the Customer.

vi) For requesting a Repair Authorization number:

(1) North and South America, Asia-Pacific, and US Military:

Hours:	0800 - 1700 Pacific Time
Days:	Monday - Friday
Tel:	+1 510 337 6600
Email:	CustomerServicesUS@vitecgroup.com

(2) Europe, the Middle East and Africa:

Hours:	0800 - midnight Central European Time
Days:	Monday - Friday
Tel:	+49 40 853 999 700
Email:	TechnicalSupportEMEA@vitecgroup.com

vii) Note: Clear-Com's Limited Warranty does not cover normal wear and tear. The Customer will be charged the full cost of the repair if their equipment has been tampered with by non-approved personnel, or has been subject to damage through electrical failure, liquid damage or mishandling. The Customer Service Center will provide the Customer with a cost estimate for any such repairs prior to undertaking the work.