APPENDIX 02/05

TEST RESULTS FOR ZYDACRON OnWAN Z340

Manufacturer:	**Zydacron**
Model:	**OnWAN Z340**
Software versions:	**3.01.012 with Service Patch**
Model modifications Add-ons, etc.	**None**
Date of Test:	**4th – 8th November 2002**

OnWan Z340 Card, Audiovisual Breakout Cable and Camera

UKERNA manages the networking programme on behalf of the higher and further education and research community in the United Kingdom. JANET, the United Kingdom's education and research network, is funded by the Joint Information Systems Committee (JISC).

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A: **SETUP PROCEDURE**

The Zydacron OnWAN Z340 is a PC card based CODEC specifically designed for IP (H.323) networks only. The plug in card requires a spare PCI slot in the users PC. Connectivity for the camera, audio, auxiliary video output and an optional audio headset are provided by a *Breakout cable*.

Set up was straightforward. The camera (including an integral microphone) was plugged into one breakout cable and positioned on top of the PC visual display unit. Software was supplied on a CD ROM but following advice from Zydacron a later version was downloaded from the Zydacron web site (*www.zydacron.com*) and installed on both systems.

The Zydacron OnWAN Z340 card and the host PC share a common IP address. During the set-up procedure user information including the IP address of the Gatekeeper, if one is deployed on the network, and the address of any on line directory are keyed into the OnWAN software menus.

The test procedure was carried out using PCs running Windows 98 in Edinburgh and Windows 2000 at Newcastle.

During the set-up period some serious problems were experienced that required the assistance of specialist network staff to diagnose and rectify. Very poor video quality was experienced between the two Zydacron OnWAN Z340 units. This was traced to auto negotiation problems between the host PCs and the local area network switches. Changing the switch settings to *Fixed Full Duplex* significantly improved the video performance. It was found that the OnWAN Z340 CODECS were also less tolerant of received packet loss than has been our experience during the evaluation of other manufacturer's equipment.

The technical details of the PC platforms were:

Newcastle	RM Pentium III	1GHz	PC	512Mb RAM	Windows 2000
Edinburgh	Dell Pentium III	933MHz	PC	256Mb RAM	Windows 98

Approximate set-up time: 45 minutes (excluding network debugging)

Documentation quality: The unit is supplied with a comprehensive Installation Guide, and a Video Camera User Manual. On completion of the software installation, online help and a Software User Guide in PDF format are also available.

B: HARDWARE DESCRIPTION

General

The Zydacron OnWAN Z340 is a PC card based CODEC intended for a spare PCI slot. The complete system includes a camera with integral microphone, an audiovisual breakout cable and the OnWAN operating software. The PC powered loudspeakers together with the camera microphone provide hands free sound. The OnWAN software generates the on-screen graphical interface and supports the following operating systems: Windows 98, NT, 2000, ME and XP.

Dimensions: CODEC Card (w x h) 22 x 10.6 cm

	Composite/YC	Connector
Video Inputs **(Breakout cable)**		
Main camera	Composite	8 pin mini DIN
Object camera/auxiliary	Y/C	4 pin mini DIN
Object camera/auxiliary	Composite	RCA Phono
Y/C – Composite adaptor		

Audio Inputs	Level	Connector
(Breakout cable)		
Camera microphone	Mic	8 pin mini DIN
Auxiliary or VCR	Line	RCA Phono
Headset microphone	Mic	3.5mm Mini jack
External microphone	Mic	3 pin Mini XLR

Audio Outputs	Level	Connector
(CODEC card)		
PC Powered Speakers	Line	3.5mm Mini jack
(Breakout cable)		
Headset earpiece	Line	3.5mm Mini jack

Other

RJ11 Phone-set connector
The audiovisual breakout cable is connected to the CODEC card via a 15-pin D type connector.

Cables Supplied

1 off audiovisual breakout cable
1 off 3.5mm Mini jack – 3.5mm Mini jack cable
1 off RCA Phono – 4 pin mini DIN connector

Mobility

As the Zydacron OnWAN Z340 CODEC is a card within a desktop PC system it cannot be moved easily. To enable operation, each new connection at each new location will require the local IP address of the host PC to be updated.

System Operation

On launching the OnWAN software application the main Video Window opens. This window comprises three sections.

1. Control Toolbar at the top of the Video Window
2. Video Window
3. Status Bar below the Video Window
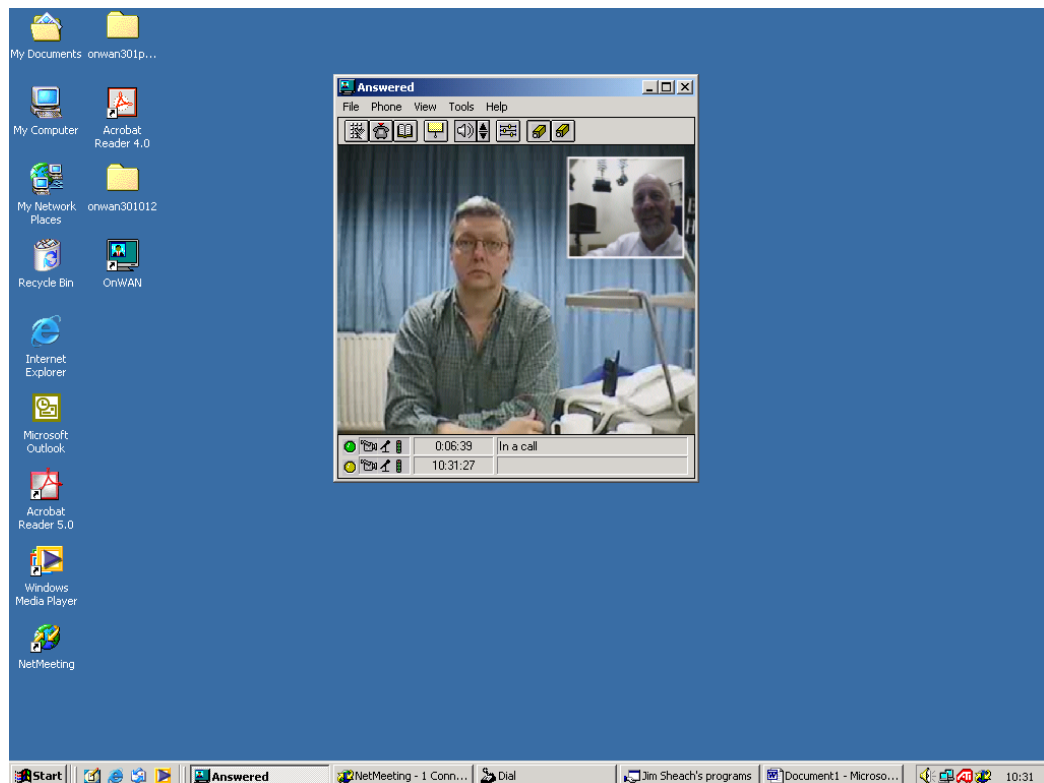
The control toolbar includes buttons to select the following menus: *Dial, Hang-up, Directory, Loudspeaker Volume, Microphone Mute, Video Input* and the *Controls* menu for video, audio and data. This Controls menu enables audio levels and the video signal type (Composite or Y/C) to be selected. The toolbar may be customised by adding/removing buttons to meet individual preferences.

When not in a call the OnWAN *Video Window* displays the local video source at CIF resolution *(352x288 pixels).* In the illustration above the overall PC display resolution is 1024x768 pixels and the default size of the Video Window is 352x288 pixels. When a call is established the window then switches to a display of the far end video with the local video reduced to a much smaller Picture in Picture (PIP). This PIP may be moved to each of the four corners of the window, varied in size or

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switched off.

The video window size may be expanded to 640x480 or even full screen but this does not increase the base CIF resolution, so the resulting video quality is then degraded accordingly.

The Status Bar below the video window is made up of two sections and displays information on both the incoming and transmitted signals:

1. Connection status information
2. Active video and audio signals (Near and Far)
3. Audio level meters (Near and Far)
4. Connection status Light Emitting Diode (LED)
5. Near End status LED
6. Call duration timer
7. Clock

The LEDs change colour to indicate: *Network Congestion, Gatekeeper Registration Status, Call Connected, and Collaboration Channel open.*

The 'manual dial' and 'address list' menus were easy to operate but only a limited number of menu options were available i.e. *IP Address* and *Bandwidth.* It is not possible for example to select video or audio compression protocols prior to a call. The last four previous calls are available via a pull down menu as opposed to the more common single last number redial. Four *Speed Dial* numbers are also offered from the 'manual dial' and 'address list' menus.

A call status page, *AVC Modes*, is readily available from the main menu and indicates the target data rate for video, data and audio*,* the audio protocol in use and the status of the data channel. It does not however provide any information on video protocols, packet loss, jitter, video frame rate, etc. However once a call has been established it is possible to force the transmitted audio protocol to G.711, G.722 or G.728 from within this AVC Modes menu

Data and Application Sharing is provided via NetMeeting. The standard NetMeeting menu is launched by opening a Data Collaboration channel between the units. Whiteboard, Chat, File Transfer and Application Sharing are then all available.

C: VIDEO TESTS

The Zydacron OnWAN Z340 specifies both H.261 and H.263 video coding. During the evaluation, when initiating a call from a Zydacron OnWAN Z340 we were unable to select the video coding. In addition there was no indication from the Z340 software of the video coding in use. Zydacron informed us that the default coding for the OnWAN Z340 was H.263. On this basis we proceeded with the tests assuming that all video coding was to H.263 protocols.

For the following tests with video protocol **H.263** the audio protocol was **G.722**.

Objective Video Tests: Signal measurements
1. 75% EBU bars
2. Grey scale

Subjective Video Impairments Tested:

Lip synchronisation	**LS**
Block distortion (tiling)	**BLK**
Blurring (reduced edge sharpness and spatial detail)	**BLR**
Colour errors	**CLR**
Jerkiness (distortion of smooth motion)	**JRK**
Object persistence	**OP**
(lagging images from previous frames as faded or outline images)	
Scene cut response (i.e. time to build up the new image)	**SCR**

Scale of impairments:

Imperceptible	**1**
Perceptible	**2**
Slightly annoying	**3**
Annoying	**4**
Very annoying	**5**

Panasonic MII Test Tape:

Signals recorded	Time on tape
1. EBU colour bars	1min 30secs
2. Grey scale	1.40 - 2.40
3. Blue field	2.50 - 3.50
4. Medium close up female face, still	4.00 - 5.00
5. Medium close up female face, talking	5.10 - 6.10
6. Close up face, nodding	6.20 - 7.20
7. Close up face, shaking head side to side	7.30 - 8.30
8. Zoom out slowly to wide angle three people	8.40 - 9.40
9. Zoom in quickly to close up of centre person	9.50 - 10.50
10. Turntable speeds: 1,2,3 and 4	11.00 - 15.30
11. Football sequence	15.40 - 16.40
12. Zoom in and out of "A to Z" map	16.50 - 17.50
13. Text legibility, font sizes 20 to 12 pt	20.30 - 20.50
14. Cut tests, scenes various with camera movements	21.00 - 22.00
15. Man teaching at whiteboard	22.10 - 23.23

To ensure accuracy of measurement at the remote site, all signals are to be monitored prior to transmission.

Test 1 (H263): Colour bar test
(Insert 75% EBU bars at local site, measure at remote site)

Unable to measure as video is displayed on PC Monitor only.

Peak to peak video amplitude	v
Peak to peak sync amplitude	v
Peak to peak burst amplitude	v
Do chroma vectors lie in their boxes?	
Any waveform aberrations?	

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	3	2
BLR	2	1
CLR	1	1

Test 2 (H.263): Grey scale
(Insert grey scale at local site, measure at remote site

Unable to measure as video is displayed on PC Monitor only.

Peak to peak video amplitude	v
Peak to peak sync amplitude	v
Any waveform aberrations?	

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	2	2
BLR	1	1
CLR	1	1

Test 3 (H.263): Blue screen
(Insert blue screen at local site, measure at remote site)

Unable to measure as video is displayed on PC Monitor only.

Any waveform aberrations?

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	2	1
CLR	1	1

Test 4 (H.263): Medium close up female (still)

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	2	2
BLR	2	1
CLR	1	1

Test 5 (H.263): Medium close up female (talking)

Subjective Impairments H.323	384 Kbps	768 Kbps
LS	3	3
BLK	4	3
BLR	2	2
CLR	1	1
JRK	2	2

Test 6 (H.263): Close up head (nodding)

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	4	4
BLR	3	3
CLR	1	1
JRK	2	2

Test 7 (H.263): Close up head (shaking side to side)

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	4	4
BLR	3	3
CLR	1	1
JRK	2	2

Test 8 (H.263): Medium close up, slow zoom out to three shot

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	3	3
BLR	3	2
CLR	1	1
JRK	3	2

Test 9 (H.263): Three shot, quick zoom in to medium close up centre person

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	4	3
BLR	4	2
CLR	1	1
JRK	3	2

Test 10 (H.263): Turntable speed 1

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	3	2
BLR	3	2
CLR	2	2
JRK	3	2

Test 10b (H.263): Turntable speed 2

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	4	3
BLR	3	2
CLR	2	2
JRK	3	3

Test 10c (H.263): Turntable speed 3

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	4	4
BLR	3	3
CLR	2	2
JRK	3	3

Test 10d (H.263): Turntable speed 4

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	4	4
BLR	3	3
CLR	2	2
JRK	4	4

Test 11 (H.263): Football sequence

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	4	4
BLR	3	3
CLR	2	2
JRK	3	3

Test 12 (H.263): Zoom in and zoom out of 'A to Z' map

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	5	5
BLR	5	5
CLR	1	1
JRK	5	5

Test 13 (H.263): Text legibility (% of screen height) at viewing distance approx. 5x screen diagonal

Legibility H.323	384 Kbps	768 Kbps
20 pt (3.5%)	Yes	Yes
16 pt (3%)	Yes	Yes
14 pt (2.5%)	No	No
12 pt (2.3%)	No	No

Test 14 (H.263): Video with several vision cuts

Subjective Impairments H.323	384 Kbps	768 Kbps
BLK	4	4
BLR	4	3
CLR	1	1
OP	1	1
SCR	3	3
JRK	5	4

Test 15 (H.263): Man teaching with flip chart

Subjective Impairments H.323	384 Kbps	768 Kbps
LS	3	3
BLK	4	3
BLR	3	2
CLR	1	1
JRK	2	2

Test 16: Playback from a domestic VHS videotape player

Is picture stable?	Yes

D: AUDIO TESTS (ITU standards only)

As the second audio line input could not be activated on either unit, it was not possible to carry out tests 2 or 3.

Test 1 was carried out with test signals inserted into the *Headset Microphone* input with the Echo Canceller set to OFF. The audio output level was then adjusted by the system volume control.

Test 1: Frequency response (-3dB)
(Insert a -30dB (Mic Level) signal at the local site, measure at remote site)

G.722	G.728	G.7111
5.6KHz	3.5KHz	3.3KHz

Test 2: Headroom (measured on G722 connection)
(Insert increasing amplitude 1 KHz tone at local site, monitor for overload distortion at remote site)

Overload occurs at: Not Measured

Test 3: Audio Level
(Insert -6dBm 1KHz tone at local site, monitor received level at remote site)

Remote site signal measures: Not Measured

Test 4: Echo Cancellation

Setup   The echo canceller is fully automatic in operation.

	Lecture Theatre	Room
Audio levels adequate? (Y/N)	Not Tested	Y
Audio quality acceptable? (Y/N)	Not Tested	Y
Echo cancellation acceptable? (Y/N)	Not Tested	Y*
Quality of double talk	Not Tested	Poor

Comments: In tests with the JVCS Management Centre the received audio level was measured as peaking between 0 and +4dBm. Tests were carried out with AGC *Off* and the microphone level was adjusted to achieve the correct received level at the management centre. With AGC *On,* when the user was not speaking there was a high background noise level. AGC status is selected from the Controls Menu.

*While the Echo Cancellation was acceptable there was a noticeable residual echo at times.

E: DATA TESTS

Successful data sharing sessions over H.323 IP networks were initiated between two Zydacron OnWAN 340 units. Sessions with a Polycom ViaVideo were also successful.

F: CONNECTIVITY

Connectivity between Like Machines

H.323

There were no problems connecting between the Zydacron OnWAN Z340 units at Edinburgh and Newcastle over H.323.

Time to Connect

H.323
All Speeds   24 Seconds

Connectivity with Other Machines (models listed with comments)

Successful connections were made in each direction with the following CODECs

H.323

Tandberg 6000
Polycom ViaVideo
Polycom VS 4000
Polycom 512MP
NetMeeting Webcam

Connectivity with JANET Videoconferencing Switching Service (JVCSS)

H.323

Successful connections were made to the Management Centre IP MCU, H.261 Video and G.722 Audio. The audio level at the Management Centre was measured as peaking between 0 and +4dBm. Although there was no indication of the video coding in use as this test was satisfactory it does prove that the OnWan Z340 is also capable of handling H.261 video coded signals.

Procedure for making a call

1. Select *Dial* button on the graphical interface toolbar.
2. Select *Call Speed*
3. Input *IP address*.
4. Select *Call* Button on the Dial Menu.

Or use the *Local* or *On-Line Directory* list from the graphical interface. Also available: a pull down list of the last four previous calls and four *Speed Dial* numbers.

G: SUMMARY

- A PCI card installed in a desktop PC operating at connection speeds between 128 Kbps & 768Kbps using the IP, H.323 protocol.
- Easy to use graphical interface.
- Supports, H.261 and H.263, video coding.
- Supports G.711, G.722, G.723, G.728, audio coding.
- Data and application sharing using NetMeeting.
- Auxiliary video and audio inputs.