



Tested BACnet devices - Summary

Description: This document describes the experiences gathered with some BACnet devices during the last BACnet meetings and workshops since 2010.

www.pcvuesolutions.com

FRANCE - Paris
ARC Informatique
Head Office

GERMANY - Munich
PcVue GmbH

ITALY - Milan
PcVue Srl

UK - London
Control Technology International

USA - Boston
PcVue Inc

SINGAPORE - Singapore
PcVue Sea

MALAYSIA – Kuala Lumpur
PcVue Sdn Bhd

CHINA - Shanghai
PcVue China

JAPAN - Nagoya
PcVue Japan

Keywords: PcVue, BACnet

Last Revision Date: 13 July 2016

ARC Informatique
ISO 9001 : 2008
ISO 14001 : 2004
certified



Authorization

	Name	Stamp	Date
Written by	JL		18 September 2012
Checked by	PB		11 October 2012
Authorized by			

Revision history

Revision	Author	Action	Editing	Date	Distribution
1.0a	JL	Creation		18/09/2012	Internal
1.1	JL	Add Azbil, Trane, SCADA ENG		31/10/2012	
1.2	JL	Add ABB, Priva and modify Trend and Azbil,		01/02/2013	
1.3	JL	Test Plugfest 2013		04/06/2013	
1.4	ABQ	Test Plugfest 2015		26/11/2015	
1.5	ABQ	Test Plugfest 2016		26/05/2016	
1.6	JL	Test Quantum Automation		13/07/2016	

The information in this book is subject to change without notice and does not represent a commitment on the part of the publisher. The software described in this book is furnished under a license agreement and may only be used or copied in accordance with the terms of that agreement. It is against the law to copy software on any media except as specifically allowed in the license agreement. No part of this manual may be reproduced or transmitted in any form or by any means without the express permission of the publisher. The author and publisher make no representation or warranties of any kind with regard to the completeness or accuracy of the contents herein and accept no liability of any kind including but not limited to performance, merchantability, fitness for any particular purpose, or any losses or damages of any kind caused or alleged to be caused directly or indirectly from this book. In particular, the information contained in this book does not substitute to the instructions from the products' vendor.

All product names and trademarks mentioned in this document belong to their respective owner

SUMMARY

1 INTRODUCTION	8
1.1 Tested Features	8
1.2 PcVue versions.....	8
1.3 Issues	8
2 BACNET DEVICES PER MANUFACTURER (PRIOR TO VERSION 11.2)	10
2.1 ABB (Vendor id: 127)	10
2.1.1 Model – ACH 550	10
2.2 Azbil or Yamatake Building Systems (Vendor id: 85).....	12
2.2.1 Model – BCY44100M0000	12
2.3 Beckhoff (Vendor id: 415).....	14
2.3.1 Model – CX-9010.....	14
2.4 Carel (Vendor id: 77).....	15
2.4.1 Model – pCOWeb/pCOnet.....	15
2.5 Cylon (Vendor id: 171)	16
2.5.1 Model – UC32.24, UC BAB	16
2.6 Delta Controls (Vendor id: 8)	18
2.6.1 Model – eBMGR-TCH	18
2.7 Elesta (Vendor id: 272)	19
2.7.1 Model – RCO 720d	19
2.8 GFR Gesellschaft für Regelungstechnik (Vendor id: 197)	20
2.8.1 ems2.....	20
2.9 Honeywell (Vendor id: 17)	22
2.9.1 Model – Excel Web	22
2.9.2 Model – CP-IPC	23
2.10 Fritz-Haber-Institut (Vendor id:)	24
2.10.1 Model –	24
2.11 HYSINE (Vendor id: 330)	25
2.11.1 Model –	25
2.12 Kieback&Peter (Vendor id: 39)	26
2.12.1 Model – BMR410	26
2.12.2 Model – DDC4000.....	27

2.13 LG (Vendor id: 432).....	28
2.13.1 Model – BNU-BAC BACnet Gateway.....	28
2.14 Loytec (Vendor id: 178)	30
2.14.1 Model – LIP-ME201.....	30
2.15 MBS GmbH (Vendor id: 50)	31
2.15.1 Model – Energy Saver	31
2.15.2 Model – MBS DO-8	32
2.16 Priva (Vendor id: 105).....	33
2.16.1 Model – Compri HX 8E.....	33
2.17 Regin AB (Vendor id: 264).....	34
2.17.1 C283DT-3	34
2.17.2 Regio RC-C3DOC	36
2.17.3 RCF-230CAD	37
2.18 SAIA (Vendor id: 89).....	38
2.18.1 Model – PCD3M 5540	38
2.19 Samson (Vendor id: 51)	39
2.19.1 Model – Trovis 6610 and 6620	39
2.20 Sauter (Vendor id: 80).....	40
2.20.1 Model – Sauter modu EY-AS 525F005	40
2.20.2 Model – Sauter modu EY-AS 525F001	41
2.21 SCADA ENGINE (Vendor id: 123).....	42
2.21.1 Model – BACnet simulator.....	42
2.22 SE-Elektronic (Vendor id: 159).....	43
2.22.1 Model – E-DDC 5.0 H	43
2.22.2 Model – X-RUS2.0	44
2.23 Siemens (Vendor id: 7).....	45
2.23.1 Model – PXG80-N.....	45
2.23.2 Model – PXC100.D	46
2.23.1 Model – PXG3.M	47
2.23.2 Model – POL904.0.....	48
2.24 SysMik GmbH (Vendor id: 163).....	49
2.24.1 Model – ICS	49
2.25 Trane (Vendor id: 2).....	50
2.25.1 Model – TRACER SUMMIT BCU.....	50
2.26 Trend (Vendor id: 91).....	51
2.26.1 Model – IQ3	51
2.27 Tridium (Vendor id: 36).....	53
2.27.1 Model – UIC	53
2.28 WAGO (Vendor id: 222)	54

2.28.1 Model – 750-830.....	54
2.28.2 Model – 750-831.....	56
3 BACNET DEVICES PER MANUFACTURER (ABOVE VERSION 11.2)	57
3.1 ABB (Vendor id: 127)	57
3.1.1 Model – AC500 PM5	57
3.1.2 Model – ACH 580	59
3.2 Beckoff Automation (Vendor id: 415).....	60
3.2.1 Model – CX-5020.....	60
3.3 Delta Controls (Vendor id: 8)	62
3.3.1 Model – DSM-RTR.....	62
3.3.2 Model – DAC-633E	64
3.4 DEOS control system GmbH (Vendor id: 142)	65
3.4.1 Model – COSMOS OPEN	65
3.5 HMS Industrial Network AB (Vendor id: 486).....	67
3.5.1 Model – Anybus BACnet/ModBus	67
3.6 LG Electronics (Vendor id: 432)	68
3.6.1 Model – ACP BACnet.....	68
3.7 Quantum Automation (Vendor id: 398)	70
3.6.1 Model – iCON-3400BP	70
3.8 Regin AB (Vendor id: 264).....	72
3.7.1 Model – EXO	72
3.9 SAIA (Vendor id: 89).....	74
3.8.1 Model – PCD3.M5560	74
3.10 Sauter (Vendor id: 80).....	76
3.9.1 Model – EY-RC504F011.....	76
3.11 Siemens (Vendor id: 9).....	77
3.10.1 Model – PXC16.2-EF.A	77
3.12 Trend (Vendor id: 91).....	78
3.11.1 Model – IQ4NC.....	78
4 GENERAL ISSUES AND SOLUTIONS:	79
4.1 Segmentation is not supported:	79
4.2 The device doesn't answer always to the "ReadPropertyMultiple" requests sent by BDS:	80
4.3 The Cov or uCov is supported by the device but that doesn't work:	81
4.4 Cov or uCov mapping on object level	83
4.5 Polling is not optimized	85
4.6 Scan is not performance	86
4.7 No Cov for specific properties	86
4.8 Checking of Cov limitation	88

4.9 The automatic subscription to alarms&events doesn't work	89
4.11 EDE file example	90
5 ANNEX:.....	91
5.1 BACnet vendor ids	91

1 Introduction

The aim of this document is to give a simple overview of the BACnet devices tested with PcVue during various IOP and on partner or customer site.

PcVue is a BACnet client which works on BACnet IP. The supported features are described in PcVue's PICS document.

1.1 Tested Features

The following features have been tested:

- Browsing,
- Tests of polling services (ReadProperty and ReadPropertyMultiple),
- Tests of notification subscription services,
- Writing services (WriteProperty and WritePropertyMultiple),
- Time synchronization,
- BBMD,
- Foreign device,
- EDE files,
- Intrinsic reporting (Alarms, acknowledgment and events),
- Algorithmic reporting,
- Logging and ReadRange Services,
- Scheduling,
- File and program status,
- Commanded actions,
- Object creation and deletion,
- Backup and restore,
- Cold and warm restart,
- Proprietary objects and properties

1.2 PcVue versions

The following PcVue versions have been used for performing the tests:

- PcVue 10.0 Windows XP or 7
- PcVue 10.0 sp1 Windows 7
- PcVue 10.1 Windows 7
- PcVue beta 11
- PcVue beta 11.2 Windows 8.1

1.3 Issues

When issues have been encountered their severity has been qualified with the following symbols:



So far so good



Low level severity



High level severity



Fatal issue

2 BACnet devices per Manufacturer (Prior to version 11.2)

All tests have been documented by listing the names of the manufacturer, their products, their firmware and the place of the tests.

2.1 ABB (Vendor id: 127)

2.1.1 Model – ACH 550

This device is an AC Drive. Profile B-ASC

Last tests: 01/11/2012 in FETA office in UK.

Firmware: 050F

Tested with PcVue 10.0 SP1 on Windows XP – x32 (BDS 2.10.0.5)



All tests were not be performed.

Test	Result	Comments
Browsing of device	-	Scan of device is Ok but the browsing of internal configuration has not been tested.
ReadProperty	OK	-
ReadPropertyMultiple	-	Not tested
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	Ok	-
Time synchronization	-	Not tested
BBMD	-	Not tested
EDE file	-	Not tested
Intrinsic reporting	-	Not tested

Known issues	Comments	Level
None		

2.2 Azbil or Yamatake Building Systems (Vendor id: 85)

2.2.1 Model – BCY44100M0000

This device has the profile: BACnet Building Controller (B-BC)

Last tests: December 2012, Azbil Singapore office.




Hardware version: PEC(NC-bus 4CH Normal) Ver.18 CPAM Ver.16

Software version: v14.79_01

Tested with PcVue 11 beta with BDS 3.0.0.4



Test	Result	Comments
Browsing of device	OK	-
ReadProperty	OK	-
ReadPropertyMultiple	OK	-
Cov subscription	OK	Warning: see known issues ¹ Warning: see known issues ²
UnCov subscription	OK	Warning: see known issues ¹ Warning: see known issues ²
WriteProperty	OK	
Time synchronization	OK	
BBMD		Not tested
EDE file		Not tested
Intrinsic reporting	OK	Warning: see known issues ³

Known issues	Comments	Level																																																																				
1	See the article: Cov or uCov mapping on object level																																																																					
2	The device doesn't send initial value after the subscription.																																																																					
3	<p>The device is able to send alarm notifications by broadcast by using the “unconfirmedEventNotification” service.</p> <table><tr><td>192.168.1.12</td><td>192.168.1.3</td><td>BACnet-APDU</td><td>Confirmed-Request [invoke:46]: readPropertyMultiple</td></tr><tr><td>192.168.1.3</td><td>192.168.1.12</td><td>BACnet-APDU</td><td>ComplexACK [invoke:46]: readPropertyMultiple</td></tr><tr><td>192.168.1.3</td><td>192.168.1.255</td><td>BACnet-APDU</td><td>Unconfirmed-Request : who-Is</td></tr><tr><td>192.168.1.3</td><td>192.168.1.255</td><td>BACnet-APDU</td><td>Unconfirmed-Request : unconfirmedEventNotification</td></tr><tr><td>192.168.1.3</td><td>192.168.1.255</td><td>BACnet-APDU</td><td>Unconfirmed-Request : unconfirmedEventNotification</td></tr><tr><td>192.168.1.3</td><td>192.168.1.255</td><td>BACnet-APDU</td><td>Unconfirmed-Request : unconfirmedEventNotification</td></tr><tr><td>192.168.1.3</td><td>192.168.1.255</td><td>BACnet-APDU</td><td>Unconfirmed-Request : unconfirmedEventNotification</td></tr><tr><td>192.168.1.3</td><td>192.168.1.255</td><td>BACnet-APDU</td><td>Unconfirmed-Request : unconfirmedEventNotification</td></tr><tr><td>192.168.1.3</td><td>192.168.1.255</td><td>BACnet-APDU</td><td>Unconfirmed-Request : unconfirmedEventNotification</td></tr><tr><td>192.168.1.3</td><td>192.168.1.255</td><td>BACnet-APDU</td><td>Unconfirmed-Request : unconfirmedEventNotification</td></tr><tr><td>192.168.1.81</td><td>192.168.1.255</td><td>BACnet-APDU</td><td>Unconfirmed-Request : who-Is</td></tr><tr><td>192.168.1.81</td><td>192.168.1.255</td><td>BACnet-APDU</td><td>Unconfirmed-Request : i-Am</td></tr><tr><td>192.168.1.3</td><td>192.168.1.255</td><td>BACnet-APDU</td><td>Unconfirmed-Request : i-Am</td></tr><tr><td>192.168.1.12</td><td>192.168.1.3</td><td>BACnet-APDU</td><td>Confirmed-Request [invoke:47]: readPropertyMultiple</td></tr><tr><td>192.168.1.3</td><td>192.168.1.12</td><td>BACnet-APDU</td><td>ComplexACK [invoke:47]: readPropertyMultiple</td></tr><tr><td>192.168.1.12</td><td>192.168.1.3</td><td>BACnet-APDU</td><td>Confirmed-Request [invoke:48]: readPropertyMultiple</td></tr><tr><td>192.168.1.3</td><td>192.168.1.12</td><td>BACnet-APDU</td><td>ComplexACK [invoke:48]: readPropertyMultiple</td></tr></table>	192.168.1.12	192.168.1.3	BACnet-APDU	Confirmed-Request [invoke:46]: readPropertyMultiple	192.168.1.3	192.168.1.12	BACnet-APDU	ComplexACK [invoke:46]: readPropertyMultiple	192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : who-Is	192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : unconfirmedEventNotification	192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : unconfirmedEventNotification	192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : unconfirmedEventNotification	192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : unconfirmedEventNotification	192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : unconfirmedEventNotification	192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : unconfirmedEventNotification	192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : unconfirmedEventNotification	192.168.1.81	192.168.1.255	BACnet-APDU	Unconfirmed-Request : who-Is	192.168.1.81	192.168.1.255	BACnet-APDU	Unconfirmed-Request : i-Am	192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : i-Am	192.168.1.12	192.168.1.3	BACnet-APDU	Confirmed-Request [invoke:47]: readPropertyMultiple	192.168.1.3	192.168.1.12	BACnet-APDU	ComplexACK [invoke:47]: readPropertyMultiple	192.168.1.12	192.168.1.3	BACnet-APDU	Confirmed-Request [invoke:48]: readPropertyMultiple	192.168.1.3	192.168.1.12	BACnet-APDU	ComplexACK [invoke:48]: readPropertyMultiple	
192.168.1.12	192.168.1.3	BACnet-APDU	Confirmed-Request [invoke:46]: readPropertyMultiple																																																																			
192.168.1.3	192.168.1.12	BACnet-APDU	ComplexACK [invoke:46]: readPropertyMultiple																																																																			
192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : who-Is																																																																			
192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : unconfirmedEventNotification																																																																			
192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : unconfirmedEventNotification																																																																			
192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : unconfirmedEventNotification																																																																			
192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : unconfirmedEventNotification																																																																			
192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : unconfirmedEventNotification																																																																			
192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : unconfirmedEventNotification																																																																			
192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : unconfirmedEventNotification																																																																			
192.168.1.81	192.168.1.255	BACnet-APDU	Unconfirmed-Request : who-Is																																																																			
192.168.1.81	192.168.1.255	BACnet-APDU	Unconfirmed-Request : i-Am																																																																			
192.168.1.3	192.168.1.255	BACnet-APDU	Unconfirmed-Request : i-Am																																																																			
192.168.1.12	192.168.1.3	BACnet-APDU	Confirmed-Request [invoke:47]: readPropertyMultiple																																																																			
192.168.1.3	192.168.1.12	BACnet-APDU	ComplexACK [invoke:47]: readPropertyMultiple																																																																			
192.168.1.12	192.168.1.3	BACnet-APDU	Confirmed-Request [invoke:48]: readPropertyMultiple																																																																			
192.168.1.3	192.168.1.12	BACnet-APDU	ComplexACK [invoke:48]: readPropertyMultiple																																																																			

But PcVue was not able to receive the broadcast events. An improvement will be implemented in the BDS to accept the event notifications by broadcast. In waiting, to bypass that, it is possible to create a specific rule in the firewall or disable the firewall.

2.3 Beckhoff (Vendor id: 415)



2.3.1 Model – CX-9010

This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2012, the BIG-EU Interoperability Workshop 2012 in Dortmund.
Firmware: 1.3.0.0 Beta

Tested with PcVue 10.0sp1 beta with BDS 2.10.0.5

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	Ok	-
UnCov subscription	Ok	-
WriteProperty	Ok	-
Time synchronization	Ok	-
BBMD	Ok	-
EDE file	-	Warning: see known issues ²

Known issues	Comments	Level
1	See the article: Cov or uCov mapping on object level	
2	Not possible to load the EDE files. The header is not in conformance with our document. That will be possible with PcVue 10.0SP1, 9.0SP3 and 10.1. In waiting, need to format the EDE file like the model used by PcVue (see EDE file example).	

2.4 Carel (Vendor id: 77)

2.4.1 Model – pCOWeb/pCOnet



This device has the profile: BACnet Application Specific Controller (B-AAC)

Last tests: 20/09/2012

Firmware:

Tested with PcVue 10.0SP1 (BDS 2.10.0.5)

Test	Result	Comments
Browsing of device	OK	-
ReadProperty	OK	-
ReadPropertyMultiple	OK	Warning: see known issues ¹
Cov subscription		Warning: see known issues ²
UnCov subscription		Warning: see known issues ²
WriteProperty	-	Not tested
Time synchronization	-	Not tested
BBMD	-	Not tested
EDE file	Ok	-

Known issues	Comments	Level
1	See the article: Segmentation is not supported	
2	See the article: The Cov or uCov is supported by the device but that doesn't work.	

2.5 Cylon (Vendor id: 171)

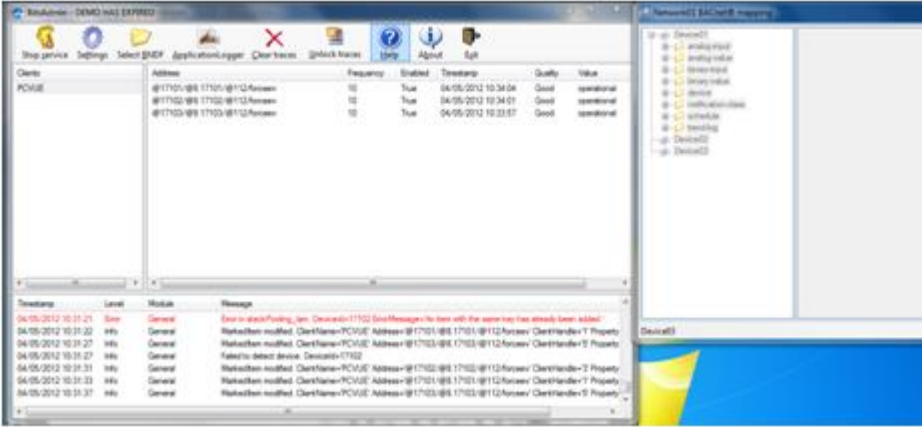

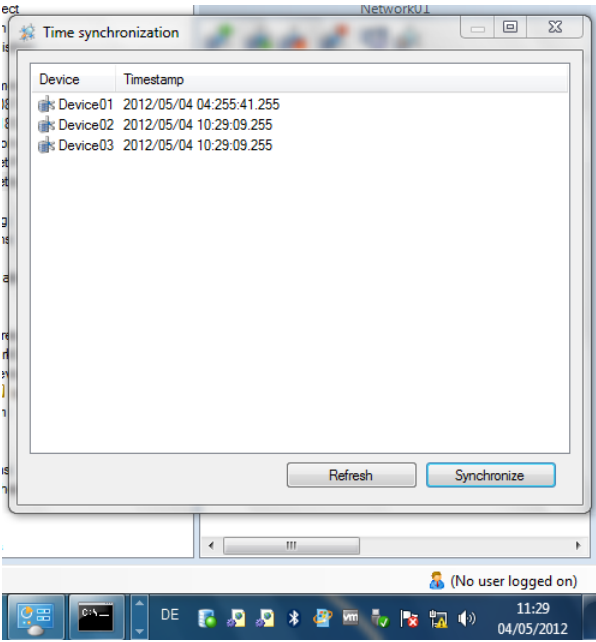

2.5.1 Model – UC32.24, UC BAB

This device has the profile: BACnet Application Specific Controller (B-ASC)

Last tests: May 2012, the BIG-EU Interoperability Workshop 2012 in Dortmund.
Firmware:

Tested with PcVue 10.0sp1 beta with BDS 2.10.0.5

Test	Result	Comments
Browsing of device	-	Warning: see known issues ¹
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	Ok	-
UnCov subscription	Ok	-
WriteProperty		
Time synchronization	-	Warning: see known issues ²
BBMD		
EDE file	-	Not tested

Known issues	Comments	Level
1	<p>Problem on browsing: turns out to be the error message: "An item with the same key has already been idea." The suspicion is that this happens when there are two connected devices which both include an object or an instance with the same name.</p> 	
2	<p>Time synchro was not working. First problem: UTC offset (note 10:29 vs. 11:29) Second problem: Strange timestamp</p> 	

2.6 Delta Controls (Vendor id: 8)


2.6.1 Model – eBMGR-TCH

This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2013, the BIG-EU Interoperability Workshop 2013 in Berlin.
Firmware: 244704

Tested with PcVue 11 beta with BDS 3.0.0.5

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	Ok	
UnCov subscription	Ok	
WriteProperty	Ok	
Time synchronization	Ok	-
BBMD		
EDE file	-	There are some unknown type in the EDE mapping
Intrinsic reporting	-	Not tested ¹

Known issues	Comments	Level
1	Intrinsic reporting has not been tested with this device but we have remarked that <i>AddListElement</i> and <i>RemoveListElement</i> services are not supported. See the article: The automatic subscription to alarms&events doesn't work.	

2.7 Elesta (Vendor id: 272)



2.7.1 Model – RCO 720d

This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2012, the BIG-EU Interoperability Workshop 2012 in Dortmund.
Firmware: 1-0-20

Tested with PcVue 10.0sp1 beta with BDS 2.10.0.5

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	-	SubscribeCov ok but warning: see known issues ¹
UnCov subscription	-	SubscribeCov ok but warning: see known issues ¹
WriteProperty	Ok	-
Time synchronization	Ok	-
BBMD	Ok	-
EDE file	-	Warning: see known issues ²

Known issues	Comments	Level
1	See the article: Cov or uCov mapping on object level	
2	Not possible to load the EDE files. The header is not in conformance with our document. That will be possible with PcVue 10.0SP1 & 9.0SP3. In waiting, need to format the EDE file like the model used by PcVue (see EDE file example).	

2.8 GFR Gesellschaft für Regelungstechnik (Vendor id: 197)



2.8.1 ems2

This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2013, the BIG-EU Interoperability Workshop 2013 in Berlin.
Firmware: ems2-BACnet 1.0

Tested with PcVue 11 beta with BDS 3.0.0.5

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	Not tested with timestamp provided by device
Cov subscription	Ok	Subscribe Ok, but not first confirmedCovNotification ¹ Not tested with timestamp provided by device
UnCov subscription	Ok	Not tested with timestamp provided by device
WriteProperty	Ok	
Time synchronization	Ok	
BBMD	Ok	
EDE file	-	The object "device" is not defined in the EDE file
Intrinsic reporting	NOK	See comments ²

Known issues	Comments	Level
1	About Cov and uCov: the device never sends the first notification after subscription. Thus, PcVue is not able to initialize the variable until the next change of value.	
2	After the subscription « unconfirmedEventNotification », the device sends several « unconfirmedEventNotification » to PcVue with always the same state. The trigger to normal state seems never to be notified (despite the configuration of property « event-enable »). The time of taking account of change (to off-normal) is sometime greater than time-delay value (approximately 20s and not 5s like is configured in the BACnet object). The subscription «confirmedEventNotification » doesn't seem work better.	

Comments:

During the tests, this device was not release and several functionalities don't work very well.

Protocol-services-supported:

```

[+] 212J
[+] protocol-services-supported: (Bit String)
  [+] Application Tag: Bit String, Length/Value/Type: 6
    Unused bits: 0
    acknowledgeAlarm = TRUE
    confirmedCOVNotification = TRUE
    confirmedEventNotification = FALSE
    getAlarmSummary = TRUE
    getEnrollmentSummary = TRUE
    subscribeCOV = TRUE
    atomicReadFile = TRUE
    atomicWriteFile = TRUE
    addListElement = TRUE
    removeListElement = TRUE
    createObject = TRUE
    deleteObject = TRUE
    readProperty = TRUE
    readPropertyConditional = FALSE
    readPropertyMultiple = TRUE
    writeProperty = TRUE
    writePropertyMultiple = TRUE
    deviceCommunicationControl = TRUE
    confirmedPrivateTransfer = FALSE
    confirmedTextMessage = FALSE
    reinitializeDevice = TRUE
    vtOpen = FALSE
    vtClose = FALSE
    vtData = FALSE
    authenticate = FALSE
    requestKey = FALSE
    i-Am = TRUE
    i-Have = TRUE
    unconfirmedCOVNotification = TRUE
    unconfirmedEventNotification = FALSE
    unconfirmedPrivateTransfer = FALSE
    unconfirmedTextMessage = FALSE
    timesynchronization = TRUE
    who-Has = TRUE
    who-Is = TRUE
    readRange = TRUE
    utcTimesynchronization = TRUE
    lifeSafetyOperation = FALSE
    subscribeCOVProperty = TRUE
    getEventInformation = TRUE
  
```

2.9 Honeywell (Vendor id: 17)



2.9.1 Model – Excel Web

This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2012, the BIG-EU Interoperability Workshop 2012 in Dortmund.
Firmware: fw-version=UBC_0-00-02-D6 bs-version=UBC_0-00-02-D6

Tested with PcVue 10.0sp1 beta with BDS 2.10.0.5

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	-	SubscribeCov ok but warning: see known issues ¹
UnCov subscription	-	SubscribeUnCov ok but warning: see known issues ¹
WriteProperty	Ok	-
Time synchronization	Ok	-
BBMD		
EDE file	-	Warning: see known issues ²

Known issues	Comments	Level
1	See the article: Cov or uCov mapping on object level	
2	Not possible to load the EDE files, the line specifying the mandatory or optional details is not present. That will be possible with PcVue 10.0SP1 & 9.0SP3. In waiting, need to format the EDE file like the model used by PcVue (add the line which specifies the mandatory and optional details) (see EDE file example).	

2.9.2 Model – CP-IPC

This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2013, the BIG-EU Interoperability Workshop 2013 in Berlin.
Firmware: CP-IPC 2.1.5

Tested with PcVue 11 beta with BDS 3.0.0.5

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	-	SubscribeCov ok but warning: see known issues ¹
UnCov subscription	-	SubscribeUnCov ok but warning: see known issues ¹
WriteProperty	Ok	-
Time synchronization	Ok	-
BBMD		
EDE file	-	
Intrinsic reporting	Ok	-

Known issues	Comments	Level
1	See the article: Cov or uCov mapping on object level	

2.10 Fritz-Haber-Institut (Vendor id:)


2.10.1 Model –

Stack development.

Last tests: May 2013, the BIG-EU Interoperability Workshop 2013 in Berlin.

Tested with PcVue 11 beta with BDS 3.0.0.5

Test	Result	Comments
Browsing of device	NOK	The properties can be browsed and BDS is not able to display the device in the BdsScanner in "FullScan" mode. ¹
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	Ok	-
Time synchronization	-	Not tested
BBMD		
EDE file	-	Not tested
Intrinsic reporting	Ok	-

Known issues	Comments	Level
1	The browsing in mode 'NoProperty' works well with BdsScanner but rescan (FullScan) doesn't work with PcVue. Maybe this problem is linked to the empty names of objects . Thus, it is possible to bypass that by saving the browsing in the bndf file of BdsScanner and copy and rename the file in C directory of PcVue project.	
2		

2.11 HYSINE (Vendor id: 330)

2.11.1 Model –



This device has the profile:

Last tests: 2012

Firmware:

Tested with PcVue 10.0SP1 beta (BDS 2.10.0.5)

Test	Result	Comments
Browsing of device	NOK	
ReadProperty	Ok	Warning: see known issues ¹ and issues ²
ReadPropertyMultiple	Ok	Warning: see known issues ¹ and issues ²
Cov subscription		
UnCov subscription		
WriteProperty		
Time synchronization		
BBMD		
EDE file		

Known issues	Comments	Level
1	See the article: Polling is not optimized.	
2	See the article: Segmentation is not supported.	

2.12 Kieback&Peter (Vendor id: 39)

2.12.1 Model – BMR410


This device has the profile:

Last tests: CHSF Evry

Firmware: 1.2

Tested with PcVue 9.0SP2 (BDS 2.10.0.1)

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	Warning: see known issues ¹
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	Ok	-
Time synchronization	-	Not tested
BBMD	NA	
EDE file	Ok	-

Known issues	Comments	Level
1	See the article: The device doesn't always answer to the "ReadPropertyMultiple" requests sent by BDS. Need to adjust the number of items.	

2.12.2 Model – DDC4000


This device has the profile: BACnet Building Controller (B-BC)

Last tests: CHSF Evry

Firmware: 1.0.14

Tested with PcVue 9.0SP2 (BDS 2.10.0.1)

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	Warning: see known issues ¹
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	Ok	-
Time synchronization	-	Not tested
BBMD	Ok	-
EDE file	Ok	-

Known issues	Comments	Level
1	See the article: The device doesn't always answer to the "ReadPropertyMultiple" requests sent by BDS. Need to adjust the number of items.	

2.13 LG (Vendor id: 432)

2.13.1 Model – BNU-BAC BACnet Gateway



This device has the profile: BACnet Application Specific Controller (B-ASC)

Last tests: Digiteolabs in Saclay (may 2012)

Firmware:

Tested with PcVue 10.0 Release (BDS 2.10.0.1)

Test	Result	Comments
Browsing of device	NOK	Warning: see known issues ¹ and issues ²
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription		
UnCov subscription		
WriteProperty	-	Not tested
Time synchronization	-	Not tested
BBMD	-	Not tested
EDE file	-	Not tested

Known issues	Comments	Level
1	Problem to read the object-list property of device. Resolved with BDS 2.10.0.7 and later. PcVue 10.0SP2, 9.0SP3, 10.1.	
2	Conflict of BACnet MacAddress. The device is a gateway which can simulate several virtual devices.	

No.	Time	Source	Destination	Protocol	Info
1	0.000000	192.168.59.106	192.168.59.255	BACnet-Unconfirmed-REQ	who-Is
2	0.642010	192.168.59.52	192.168.59.255	BACnet-Unconfirmed-REQ	who-Is
3	0.642223	192.168.59.52	192.168.59.255	BACnet-Unconfirmed-REQ	who-Is
4	0.648460	192.168.59.106	192.168.59.52	BACnet-Unconfirmed-REQ	i-Am device,1
5	0.650807	192.168.59.60	192.168.59.255	BACnet-Unconfirmed-REQ	i-Am device,222
6	0.656192	192.168.59.106	192.168.59.52	BACnet-Unconfirmed-REQ	i-Am device,2
7	0.662018	192.168.59.106	192.168.59.52	BACnet-Unconfirmed-REQ	i-Am device,22
8	0.667899	192.168.59.106	192.168.59.52	BACnet-Unconfirmed-REQ	i-Am device,89

Frame 6: 71 bytes on wire (568 bits), 71 bytes captured (568 bits)

Ethernet II, Src: IntelCor_a3:83:d0 (00:1c:c0:a3:83:d0), Dst: Vmware_9e:f1:e0 (00:0c:29:9e:f1)

Internet Protocol, Src: 192.168.59.106 (192.168.59.106), Dst: 192.168.59.52 (192.168.59.52)

User Datagram Protocol, Src Port: bacnet (47808), Dst Port: bacnet (47808)

BACnet Virtual Link Control

Building Automation and Control Network NPDU

Version: 0x01 (ASHRAE 135-1995)

Control: 0x08

Source Network Address: 20

Source MAC Layer Address Length: 6

SADR: 02:00:00:00:00:00 (02:00:00:00:00:00)

Device details

Id	2
Name	New Virtual Device
Vendor identifier	123
Vendor name	SCADA Engine
Model name	SCADA Engine Server for Windows V1.0
Application software version	1.0
Firmware revision	3.0.1152.13
MAC address	2-0-0-0-0-0
Max APDU length	1024
Support read multiple	True
Read multiple max length	-1

MAC address = Device id and the other bytes are completed by 0

The above screenshot indicates how the BACnet simulator generates the MAC address for these virtual devices.

2.14 Loytec (Vendor id: 178)

2.14.1 Model – LIP-ME201

This device is used for the development of the BACnet driver for PcVue 10.0 SP1 and 10.1.

BACnet MSTP router tested without MSTP module.

Last tests: in office at Auberchicourt
Firmware:

Tested with PcVue 10.0SP1 (BDS 2.10.0.5)

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	Ok	-
UnCov subscription	Ok	-
WriteProperty	-	Not tested
Time synchronization	Ok	-
BBMD	Ok	-
EDE file	Ok	-

Known issues	Comments	Level
1	None	

2.15 MBS GmbH (Vendor id: 50)


2.15.1 Model – Energy Saver

This device has the profile:

Last tests: May 2011, the BIG-EU Interoperability Workshop 2011 in Saarbrücken.
Firmware: Revision 1.0

Tested with PcVue 10.0 beta (BDS 2.8.0.0)

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	Ok	-
UnCov subscription	Ok	-
WriteProperty	Ok	-
Time synchronization	Ok	-
BBMD		
EDE file	Ok	Warning: see known issues ¹

Known issues	Comments	Level
1	EDE-file doesn't contain all information of the header except VERSION_OF_LAYOUT. Import Ok with 10.0.SP1, 9.0SP3 and 10.1.	
2		


2.15.2 Model – MBS DO-8

This device has the profile:

Last tests: May 2011, the BIG-EU Interoperability Workshop 2011 in Saarbrücken.
Firmware: V1.0

Tested with PcVue 10.0 beta (BDS 2.8.0.0)

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	NA	-
Cov subscription	Ok	-
UnCov subscription	Ok	-
WriteProperty	Ok	-
Time synchronization	Ok	-
BBMD	-	Not tested
EDE file	Ok	Warning: see known issues ¹

Known issues	Comments	Level
1	EDE-file doesn't contain all information of the header except VERSION_OF_LAYOUT. Import Ok with 10.0.SP1, 9.0SP3 and 10.1.	
2		

2.16 Priva (Vendor id: 105)

2.16.1 Model – Compri HX 8E

This device is a Building Controller: BACnet Building Controller (B-BC)

Last tests: 01/11/2012 in FETA office in UK.

Firmware: 2.21.66.10222

Tested with PcVue 10.0 SP1 on Windows XP – x32 (BDS 2.10.0.5)



All tests were not be performed.

Test	Result	Comments
Browsing of device	-	Scan of device is Ok but the browsing of internal configuration has not been tested.
ReadProperty	Ok	-
ReadPropertyMultiple	-	Not tested
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	OK	-
Time synchronization	-	Not tested
BBMD	-	Not tested
EDE file	-	Not tested
Intrinsic reporting	-	Not tested

Known issues	Comments	Level
None		

2.17 Regin AB (Vendor id: 264)

2.17.1 C283DT-3

This device has the profile: BACnet Application Specific Controller (B-ASC)

Last tests: May 2013, the BIG-EU Interoperability Workshop 2013 in Berlin.

Firmware: 3.0-4-00

Tested with PcVue 11 beta (BDS 3.0.0.5)

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	-	Not supported
UnCov subscription	-	Not supported
WriteProperty	NOK	Access denied for some devices, for other it writes but the value is not saved by the device.
Time synchronization		UtcTimeSynchronization not supported
BBMD		
EDE file	Ok	
Intrinsic reporting	-	Not supported

Known issues	Comments	Level
1		

```

    Length: value type: 0
    Unused bits: 0
    acknowledgeAlarm = FALSE
    confirmedCOVNotification = FALSE
    confirmedEventNotification = FALSE
    getAlarmSummary = FALSE
    getEnrollmentSummary = FALSE
    subscribeCOV = FALSE
    atomicReadFile = FALSE
    atomicWriteFile = FALSE
    addListElement = FALSE
    removeListElement = FALSE
    createObject = FALSE
    deleteObject = FALSE
    readProperty = TRUE
    readPropertyConditional = FALSE
    readPropertyMultiple = TRUE
    writeProperty = TRUE
    writePropertyMultiple = FALSE
    deviceCommunicationControl = TRUE
    confirmedPrivateTransfer = FALSE
    confirmedTextMessage = FALSE
    reinitializeDevice = FALSE
    vtOpen = FALSE
    vtClose = FALSE
    vtData = FALSE
    authenticate = FALSE
    requestKey = FALSE
    i-Am = FALSE
    i-Have = FALSE
    unconfirmedCOVNotification = FALSE
    unconfirmedEventNotification = FALSE
    unconfirmedPrivateTransfer = FALSE
    unconfirmedTextMessage = FALSE
    timesynchronization = TRUE
    who-Has = TRUE
    who-Is = TRUE
    readRange = FALSE
    utcTimesynchronization = FALSE
    lifesafetyoperation = FALSE
    subscribeCOVProperty = FALSE
    getEventInformation = FALSE
} [3]

```

2.17.2 Regio RC-C3DOC

This device has the profile: BACnet Application Specific Controller (B-ASC)

Last tests: May 2013, the BIG-EU Interoperability Workshop 2013 in Berlin.
Firmware: 1.4.1.2 1947

Tested with PcVue 11 beta (BDS 3.0.0.5)

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	-	Not supported
UnCov subscription	-	Not supported
WriteProperty	NOK	Access denied for some devices, for other it writes but the value is not saved by the device.
Time synchronization	-	TimeSynchronization and UtcTimeSynchronization don't supported
BBMD		
EDE file	Ok	
Intrinsic reporting	-	Not supported

Known issues	Comments	Level
1		

2.17.3 RCF-230CAD

Last tests: May 2013, the BIG-EU Interoperability Workshop 2013 in Berlin.
Firmware: 1.2.0.0 1723

Tested with PcVue 11 beta (BDS 3.0.0.5)

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple		-
Cov subscription	-	Not supported
UnCov subscription	-	Not supported
WriteProperty	NOK	Access denied for some devices, for other it writes but the value is not saved by the device.
Time synchronization	-	TimeSynchronization and UtcTimeSynchronization don't supported
BBMD		
EDE file	Ok	
Intrinsic reporting	-	Not supported

Known issues	Comments	Level
1		

Comments:

- These devices don't support scheduling and alarm&event.

2.18 SAIA (Vendor id: 89)

2.18.1 Model – PCD3M 5540

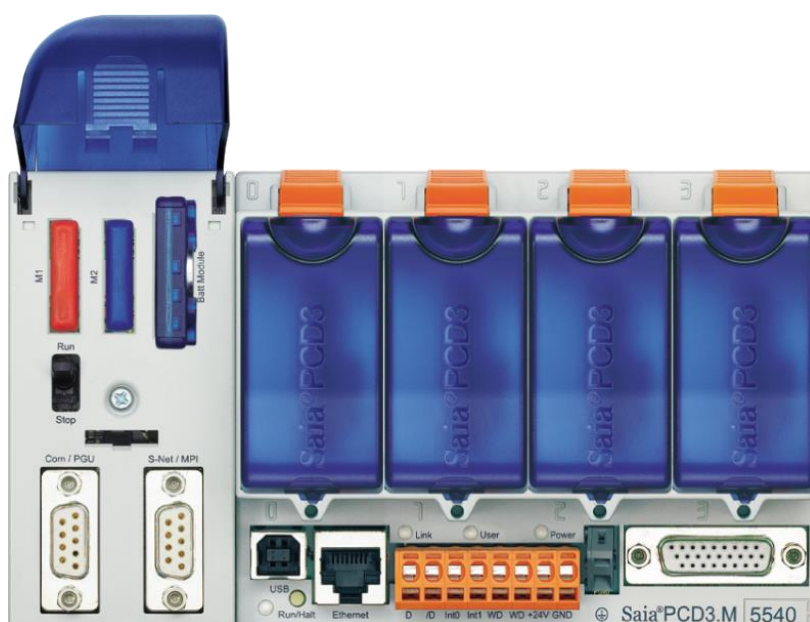
This device is used for the development of the BACnet driver for PcVue 10.0 SP1 and 10.1.

This device has the profile: BACnet Building Controller (B-BC)

Last tests: 18/09/2012 in Auberchicourt Office.

Firmware: 1.10.56

Tested with PcVue 10.1 BETA on Windows 7 – x64 (BDS 3.0.0.1)



Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	Ok	Warning: see known issues ¹ (Ok except on object level)
UnCov subscription	Ok	Warning: see known issues ¹ (Ok except on object level)
WriteProperty	Ok	-
Time synchronization	Ok	-
BBMD	-	Not tested
EDE file	Ok	Ok with 10.0SP1, 9.0SP3, 10.1
Intrinsic reporting	OK	-

Known issues	Comments	Level
1	This device doesn't subscribe to the status-flag property only. So, the subscription on object level doesn't work with it. Info: SubscribeCovProperty is supported. See the article: Cov or uCov mapping on object level	

2.19 Samson (Vendor id: 51)



2.19.1 Model – Trovis 6610 and 6620

This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2013, the BIG-EU Interoperability Workshop 2013 in Berlin.
Firmware: SAMSON BACstack 1.6

Tested with PcVue 11 beta (BDS 3.0.0.5)

Test	Result	Comments
Browsing of device	Ok	Warning: see known issues ¹
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	Ok	-
UnCov subscription	Ok	-
WriteProperty	-	Warning: see known issues ²
Time synchronization	Ok	-
BBMD	-	Not tested
EDE file	Ok	-

Known issues	Comments	Level
1	Device name, vendor-name etc. could not be read as it was sent encoded in UCS-2 (ISO 10646). Reproducible.	
2	The property schedule-default could not be set to null (<Any name="value"><Null></Null></Any>).	

2.20 Sauter (Vendor id: 80)


2.20.1 Model – Sauter modu EY-AS 525F005

This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2012, the BIG-EU Interoperability Workshop 2012 in Dortmund.
Firmware: V2.3.2

Tested with PcVue 10.0sp1 beta with BDS 2.10.0.5

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	Ok	-
UnCov subscription	Ok	-
WriteProperty	Ok	-
Time synchronization	Ok	-
BBMD		
EDE file	Ok	-

Known issues	Comments	Level
1	Problem of read property: Apparently, in the mapping box, the value of object-name is split after the character ".". Origin of problem (BDS or PcVue) has not been determined.	
2		

2.20.2 Model – Sauter modu EY-AS 525F001

This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2013, the BIG-EU Interoperability Workshop 2013 in Berlin.
Firmware: V2.6.0

Tested with PcVue 11 beta with BDS 3.0.0.5

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	Not tested with timestamp provided by device
Cov subscription	Ok	-
UnCov subscription	Ok	Not tested with timestamp provided by device
WriteProperty	Ok	-
Time synchronization	Ok	-
BBMD		
EDE file	Ok	-
Intrinsic reporting	Ok	-

Known issues	Comments	Level
1		

2.21 SCADA ENGINE (Vendor id: 123)

2.21.1 Model – BACnet simulator



This device is the BACnet server simulator.

Last tests: in office at Auberchicourt.

Firmware: 3.0.8

Tested with PcVue 10.1 BETA on Windows 7 – x64 (BDS 3.0.0.3)

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	Ok	-
UnCov subscription	Ok	-
WriteProperty	Ok	-
Time synchronization	Ok	-
BBMD		
EDE file	Ok	-
Intrinsic reporting	Ok	Warning: see known issues ¹²

Known issues	Comments	Level
1	It is not possible that 2 BACnet clients to receive the alarms&events notifications when both are registered in the recipient-list property of notification-class object.	
2	It is not possible to simulate the events notifications by broadcast with this device.	

2.22 SE-Elektronic (Vendor id: 159)


2.22.1 Model – E-DDC 5.0 H

This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2011, the BIG-EU Interoperability Workshop 2011 in Saarbrücken.
Firmware: A3.03.06-build: 12452M @ Tue May 10 12:28:08 2011

Tested with PcVue 10.0 beta (BDS 2.8.0.0)

Test	Result	Comments
Browsing of device	Ok	Warning: see known issues ¹
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	Ok	-
UnCov subscription	Ok	-
WriteProperty	Ok	-
Time synchronization	Ok	-
BBMD		
EDE file	Ok	-

Known issues	Comments	Level
1	Device name, vendor-name etc. could not be read as it was sent encoded in ISO 8559-1. Reproducible.	
2		


2.22.2 Model – X-RUS2.0

This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2011, the BIG-EU Interoperability Workshop 2011 in Saarbrücken.
Firmware:

Tested with PcVue 10.0 beta (BDS 2.8.0.0)

Test	Result	Comments
Browsing of device	Ok	Warning: see known issues ¹
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	Ok	-
UnCov subscription	Ok	-
WriteProperty	Ok	-
Time synchronization	Ok	-
BBMD		
EDE file	Ok	-

Known issues	Comments	Level
1	Device name, vendor-name etc. could not be read as it was sent encoded in ISO 8559-1. Reproducible.	
2		

2.23 Siemens (Vendor id: 7)

2.23.1 Model – PXG80-N

This device is a BACnet router (BACnet over LonTalk):

Last tests: 04/09/2012 in GEMMO office in Milan, Italy.


Firmware: FW=V2.10.014 / BACStack=V1.00 / HW=V1.00 / FCT=V2.10.044 / W&T V1.25

Tested with PcVue 10.1 BETA on Windows 7 – x64 (BDS 3.0.0.1)



All tests could not be performed. The device was not completely configured and it does not support DataSet and DataReport services.
All tests are based only on the polling of datagroup.

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	-	Not tested
Time synchronization	-	Not tested
BBMD	Ok	-
EDE file	Ok	-

Known issues	Comments	Level
None	See application with other devices like PXC100.D.	

2.23.2 Model – PXC100.D


This device has the profile: BACnet Building Controller (B-BC)
This device is a modular automation station which works over LON. It has been tested with a BACnet router PXG80-N.

Last tests: 04/09/2012 in GEMMO office in Milan, Italy.

Firmware: FW=V4.00.080 / SBC=05.10 / FLI=04.00 / BBI=10.05 / STF=01.10

Tested with PcVue 10.1 BETA on Windows 7 – x64 (BDS 3.0.0.1)

Test	Result	Comments
Test	Result	Comments
Browsing of device	Ok	Warning: see known issues ¹
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	-	Not tested
Time synchronization	-	Not tested
BBMD	NA	
EDE file	Ok	-

Known issues	Comments	Level
1	<p>Browsing and access data doesn't work when the network number of BdsAdmin is set at 1. That would seem it is a problem from Siemens device. The module answers always that it is located in the BACnet network 1 even if it is not the case. So, BDS think the network is BACnet/IP and sends the requests to the IP deduced with the MAC address of the device.</p> <p>To bypass that, it will be possible to set another network number than 1. In a next version of BDS, it will be possible to set the value 0 to avoid another problem with BACnet/MSTP (see POL904.0).</p>	

2.23.1 Model – PXG3.M

This device is a BACnet router (BACnet over MSTP):


Last tests: 04/09/2012 in GEMMO office in Milan, Italy.

Application software version: May_31_2012_08_47_39

Firmware: FW=01.00.23.446; SBC=10.10;

Tested with PcVue 10.1 BETA on Windows 7 – x64 (BDS 3.0.0.1)

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	-	Not tested
Time synchronization	-	Not tested
BBMD	-	Not tested
EDE file	Ok	-

Known issues	Comments	Level
None	See application with other devices like PXC100.D.	

2.23.2 Model – POL904.0

This device has the profile: BACnet Building Controller (B-BC)

This device is a modular automation station which works over MSTP. It has been tested with a BACnet router PXG3.M.



Last tests: 04/09/2012 in GEMMO office in Milan, Italy.

Application software version: ver 2 for VVS8.40

Firmware: 8.14

Tested with PcVue 10.1 BETA on Windows 7 – x64 (BDS 3.0.0.1)

Test	Result	Comments
Test	Result	Comments
Browsing of device	Ok	Warning: see known issues ¹
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	Warning: see known issues ²
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	-	Not tested
Time synchronization	-	Not tested
BBMD	NA	
EDE file	Ok	-

Known issues	Comments	Level
1	Warning, browsing and access data doesn't work when the network number of BdsAdmin is the same as the MSTP network number.	
2	See the article: The device doesn't always answer to the "ReadPropertyMultiple" requests sent by BDS. Need to adjust the number of items.	

2.24 SysMik GmbH (Vendor id: 163)



2.24.1 Model – ICS

This device has the profile: BACnet Advanced Application Controller (B-AAC)

Last tests: May 2011, the BIG-EU Interoperability Workshop 2011 in Saarbrücken.
Firmware: 1.0

Tested with PcVue 10.0 beta (BDS 2.8.0.0)

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	Warning: see known issues ¹
ReadPropertyMultiple	Ok	Warning: see known issues ¹
Cov subscription	Ok	Warning: see known issues ²
UnCov subscription	Ok	Warning: see known issues ²
WriteProperty	Ok	
Time synchronization	Ok	-
BBMD		
EDE file	Ok	-

Known issues	Comments	Level
1	Exception-schedule could not be read.	
2	Some properties of BACnet object "schedule" (32, 117, 174) have the quality "uncertain" when we use the monitoring type "Cov" or "Uncov". (Check PICS if SubscribeCovproperty is supported.)	

2.25 Trane (Vendor id: 2)

2.25.1 Model – TRACER SUMMIT BCU

This device works like a BACnet "gateway".



Last tests: Louvre-Lens (october 2012)

Firmware: 17.073

Tested with PcVue 10.0Update1 (BDS 2.10.0.5)



Test	Result	Comments
Browsing of device	OK	Warning: see known issues ¹
ReadProperty	OK	
ReadPropertyMultiple	OK	Warning: see known issues ²
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	-	Not tested
Time synchronization	-	Not tested
BBMD	-	Not tested
EDE file	-	Not tested

Known issues	Comments	Level
1	See the article: Scan is not performance.	
2	When the number of items in the "ReadPropertyMultiple" requests is too great, the device doesn't answer and crashes. See the article: The device doesn't always answer to the "ReadPropertyMultiple" requests sent by BDS. Need to adjust the number of items.	

2.26 Trend (Vendor id: 91)

2.26.1 Model – IQ3






This device has the profile: BACnet Application Specific Controller (B-ASC)

Last tests: CRNA Reims (november 2012)

Firmware: IQ3xcite96 and IQ3xcite128

Tested with PcVue 10.0Update1 (BDS 2.10.0.5)

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	Warning: see known issues ¹
Cov subscription	Ok	Warning: see known issues ^{2 3 4}
UnCov subscription	Ok	Warning: see known issues ^{2 3 4}
WriteProperty	Ok	-
Time synchronization	-	Not tested
BBMD	-	Not tested
EDE file	Ok	-
Intrinsic reporting	Ok	Warning: see known issues ⁵

Known issues	Comments	Level
1	See the article: The device doesn't always answer to the "ReadPropertyMultiple" requests sent by BDS. Need to adjust the number of items (approximately 20).	
2	See the article: The Cov or uCov is supported by the device but that doesn't work.	
3	See the article: checking of Cov limitation. The limit is 401 subscriptions.	
4	See the article: No Cov for specific properties.	
5	<p>The device doesn't support the "addListElement" and "removeListElement" services (see PICS).</p> <div data-bbox="402 779 1189 1153" data-label="Code-Block"> <pre> - protocol-services-supported: (Bit String) + Application Tag: Bit String, Length/value/type: 6 Unused bits: 0 acknowledgeAlarm = FALSE confirmedCOVNotification = FALSE confirmedEventNotification = FALSE getAlarmSummary = FALSE getEnrollmentSummary = FALSE subscribeCOV = TRUE atomicReadFile = FALSE atomicWriteFile = FALSE addListElement = FALSE removeListElement = FALSE </pre> </div> <p>So, a BACnet client is not able to register itself to the notification-class. The user has to define manually each BACnet client in the configuration of device and in this case, it is not necessary to create notification objects.</p>	

2.27 Tridium (Vendor id: 36)

2.27.1 Model – UIC



This device has the profile:

Last tests: September 2012

Firmware:

Tested with PcVue 10.0SP1 (BDS 2.10.0.5)

Test	Result	Comments
Browsing of device	NOK	Warning: see known issues ¹
ReadProperty	Ok	-
ReadPropertyMultiple	NA	Warning: see known issues ²
Cov subscription	NA	-
UnCov subscription	NA	-
WriteProperty	-	Not tested
Time synchronization	-	Not tested
BBMD		
EDE file		

Known issues	Comments	Level
1	Some objects defined in the object-list property don't exist in the device. To bypass: BDS 2.10.0.7 and next (PcVue 10.0SP2, 9.0SP3, 10.1).	
2	The device indicates it supports the readMultipleProperty but it doesn't support it. To bypass: BDS 2.10.0.7 and next (PcVue 10.0SP2, 9.0SP3, 10.1).	

2.28 WAGO (Vendor id: 222)

2.28.1 Model – 750-830




This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2011, the BIG-EU Interoperability Workshop 2011 in Saarbrücken.
Firmware:

Tested with PcVue 10.0 beta (BDS 2.8.0.0)



Test	Result	Comments
Browsing of device	Ok	Warning: see known issues ¹
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	-
Cov subscription	Ok	-
UnCov subscription	Ok	-
WriteProperty	Ok	-
Time synchronization	Ok	-
BBMD	-	Not tested
EDE file	Ok	Warning: see known issues ³

Known issues	Comments	Level
1	With this device, some properties are not detected by the BDS scanner (exception-schedule) by setting the scanner with the mode "normal". By using the mode "full" with BdsScanner, it works. In this case, the mapping box of PcVue won't display these properties. However, these properties are mappable by setting manually the property field in PcVue with the property name (or property number).	
2	When undefined on the device the "present-value" of Averaging objects shows strange values. Value should actually be NaN. In the BdsAdmin it is displayed as "n.def." After the value changes to a valid value everything is displayed in the right way.	
3	Not possible to load the EDE files. The line which specifies the mandatory or optional details is not present. It works with PcVue 10.0 Release, 10.0SP1 & 9.0SP3 and 10.1. Or to bypass, need to format the EDE file like the model used by PcVue (add the line which specifies the mandatory and optional details) (see EDE file example).	

2.28.2 Model – 750-831

This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2013, the BIG-EU Interoperability Workshop 2013 in Berlin.
Firmware: 00.00.09(00)

Tested with PcVue 11beta (BDS 3.0.0.5)

Test	Result	Comments
Browsing of device	Ok	-
ReadProperty	Ok	-
ReadPropertyMultiple	Ok	Not tested with timestamp provided by device
Cov subscription	Ok	Not tested with timestamp provided by device
UnCov subscription	Ok	-
WriteProperty	Ok	-
Time synchronization	Ok	-
BBMD		
EDE file	Ok	
Intrinsic reporting	Ok	-

3 BACnet devices per Manufacturer (Above version 11.2)

All tests have been documented by listing the names of the manufacturer, their products, their firmware and the place of the tests.

3.1 ABB (Vendor id: 127)

3.1.1 Model – AC500 PM5

This device has the profile: BACnet Building Controller (B-BC) (Coupled to HMI)

Last tests: May 2016, the BIG-EU BACnet PlugFest in Berne.

Firmware: 1.0.0

Protocol revision / version: 12/1

Tested with PcVue beta 11.2.3022.17414 on Windows 7

Test	Result	Comments
Browsing of device	OK	
ReadProperty	OK	
ReadPropertyMultiple	-	Not supported
Cov subscription	-	Not supported
UnCov subscription	-	Not supported
WriteProperty	OK	
WritePropertyMultiple	-	Not supported
Time synchronization	-	Not supported
BBMD	-	Not supported
Foreign device	-	Not supported
EDE file	-	None available
List element management	-	Not supported
UnConf event notification	-	Not supported
Acknowledgment	-	Not supported
Trend logging	-	Not supported
Trend logging multiple	-	Not supported
Event logging	-	Not supported
ReadRange	-	Not supported
Event enrollment	-	Not supported
Schedulling	-	Not supported
Commanded actions	-	Not supported
File and program status	-	Not supported
Object creation	-	Not supported
Object deletion	-	Not supported
Backup and restore	-	Not supported
Cold restart	-	Not supported
Warm restart	-	Not supported

Proprietary object	-	Not supported
Proprietary properties	-	Not supported
Communication management	OK	

3.1.2 Model – ACH 580

This device has the profile:

Last tests: May 2016, the BIG-EU BACnet PlugFest in Berne.

Firmware: 0042

Protocol revision / version: 12/1

Tested with PcVue beta 11.2.3022.17414 on Windows 7

Test	Result	Comments
Browsing of device	OK	
ReadProperty	OK	
ReadPropertyMultiple	-	Not supported
Cov subscription	OK	
UnCov subscription	OK	
WriteProperty	OK	
WritePropertyMultiple	OK	
Time synchronization	-	Not supported
BBMD	-	Not tested
Foreign device	-	Not tested
EDE file	-	None available
List element management	-	Not supported
UnConf event notification	-	Not tested
Acknowledgment	-	Not tested
Trend logging	-	Not tested
Trend logging multiple	-	Not tested
Event logging	-	Not tested
ReadRange	-	Not tested
Event enrollment	-	Not tested
Schedulling	-	Not tested
Commanded actions	-	Not tested
File and program status	-	Not tested
Object creation	-	Not tested
Object deletion	-	Not tested
Backup and restore	-	Not tested
Cold restart	OK	
Warm restart	OK	
Proprietary object	-	Not tested
Proprietary properties	-	Not tested
Communication management	-	Not tested

3.2 Beckoff Automation (Vendor id: 415)

3.2.1 Model – CX-5020

This device has the profile: BACnet Building Controller (B-BC)





Last tests: May 2016, the BIG-EU BACnet PlugFest in Berne.

Firmware: 2.2.0.1 Beta

Protocol revision / version:

Tested with PcVue beta 11.2.3022.17414 on Windows 10

Test	Result	Comments
Browsing of device	OK	
ReadProperty	OK	
ReadPropertyMultiple	OK	
Cov subscription	OK	
UnCov subscription	OK	
WriteProperty	OK	
WritePropertyMultiple	OK	
Time synchronization	OK	
BBMD	-	Not tested
Foreign device	-	Not tested
EDE file	OK	cx5020_EDE, cx5020_ObjTypes, cx5020_StateTexts, cx5020_Units
List element management	OK	
UnConf event notification	OK	
Acknowledgment	OK	
Trend logging	OK	Warning: see known issues ¹
Trend logging multiple	nOK	Warning: see known issues ²
Event logging	OK	
ReadRange	nOK	Warning: see known issues ³
Event enrollment	OK	
Schedulling	OK	
Commanded actions	OK	
File and program status	OK	
Object creation	OK	Tested with Multi-State Value and Binary Value objects
Object deletion	OK	Tested with Binary Value objects
Backup and restore	nOK	Warning: see known issues ⁴
Cold restart	-	Not supported
Warm restart	OK	
Proprietary object	-	Not supported
Proprietary properties	OK	
Communication management	OK	

Known issues	Comments	Level
1	Buffer size is Read Only, hence cannot be modified. Buffer can be reset through Record_Count = 0.	
2	Logging using Polling is implemented and handled correctly. However, Logging by ChangeOfValue is not supported.	
3	ReadRange requests using NoRange is implemented and handled correctly. However, requests using ByTime with Count is not supported.	
4	Backup is supported but Restore cause the Device to be in an unstable state, hence not supported correctly. (Besides, firmware version 2.3.0.0 should support it)	

3.3 Delta Controls (Vendor id: 8)

3.3.1 Model – DSM-RTR

This device has the profile: BACnet Router (B-RTR).



Last tests: November 2015, the BIG-CA BACnet Golden Week PlugFest in Shenzhen.

Firmware:

Protocol revision / version:

Tested with PcVue beta 11.200018 on Windows 8.1

Test	Result	Comments
Browsing of device	OK	
ReadProperty	OK	
ReadPropertyMultiple	OK	
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	OK	
WritePropertyMultiple	-	Not tested
Time synchronization	OK	Warning: see known issues ¹
BBMD	OK	
Foreign device	OK	
EDE file	-	Not tested
List element management	nOK	Warning: see known issues ²
UnConf event notification	OK	
Acknowledgment	-	Not tested
Trend logging	-	Not tested
Trend logging multiple	-	Not tested
Event logging	-	Not tested
ReadRange	-	Not tested
Event enrollment	-	Not tested
Schedulling	OK	
Commanded actions	-	Not tested
File and program status	OK	
Object creation	-	Not tested
Object deletion	-	Not tested
Backup and restore	-	Not tested
Cold restart	-	Not tested
Warm restart	-	Not tested
Proprietary object	-	Not tested
Proprietary properties	-	Not tested
Communication management	-	Not tested

Known issues	Comments	Level
1	Doesnot transfer it if UniCast	
2	Handled through Write service instead	

3.3.2 Model – DAC-633E

This device has the profile: BACnet Building Controller (B-BC)


Last tests: November 2015, the BIG-CA BACnet Golden Week PlugFest in Shenzhen.

Firmware:

Protocol revision / version:

Tested with PcVue beta 11.200018 on Windows 8.1

Test	Result	Comments
Browsing of device	OK	
ReadProperty	OK	
ReadPropertyMultiple	OK	
Cov subscription	OK	
UnCov subscription	OK	
WriteProperty	OK	
WritePropertyMultiple	OK	
Time synchronization	-	Could not test, request not transferred by overlaying network router
BBMD	OK	
Foreign device	OK	
EDE file	-	Not tested
List element management	nOK	Warning: see known issues ¹
UnConf event notification	OK	
Acknowledgment	-	Not tested
Trend logging	OK	
Trend logging multiple	-	Not tested
Event logging	-	Not tested
ReadRange	-	Not tested
Event enrollment	OK	
Schedulling	OK	
Commanded actions	-	Not tested
File and program status	OK	
Object creation	OK	
Object deletion	OK	
Backup and restore	OK	
Cold restart	OK	
Warm restart	OK	
Proprietary object	-	Not tested
Proprietary properties	-	Not tested
Communication management	-	Not tested

Known issues	Comments	Level
1	Handled through Write service instead	

3.4 DEOS control system GmbH (Vendor id: 142)

3.4.1 Model – COSMOS OPEN

This device has the profile: BACnet Building Controller B-BC





Last tests: May 2016, the BIG-EU BACnet PlugFest in Berne.

Firmware: 1.048.2

Protocol revision / version: 12/1

Tested with PcVue beta 11.2.3022.17414 on Windows 7

Test	Result	Comments
Browsing of device	OK	
ReadProperty	OK	
ReadPropertyMultiple	OK	
Cov subscription	OK	
UnCov subscription	OK	
WriteProperty	OK	
WritePropertyMultiple	OK	
Time synchronization	OK	
BBMD	-	Not tested
Foreign device	-	Not tested
EDE file	OK	142-106_EDE, 142-106_Object-Types, 142-106_State-Texts, 142-106_Units-Texts
List element management	OK	
UnConf event notification	nOK	Warning: see known issues ¹
Acknowledgment	-	Not supported
Trend logging	nOK	Warning: see known issues ²
Trend logging multiple	-	Not supported
Event logging	-	Not supported
ReadRange	nOK	Warning: see known issues ³
Event enrollment	-	Not supported
Schedulling	OK	
Commanded actions	-	Not tested
File and program status	OK	
Object creation	OK	Warning: see known issues ⁴
Object deletion	OK	Warning: see known issues ⁴
Backup and restore	-	Not supported
Cold restart	-	Not tested, no security password provided
Warm restart	-	Not tested, no security password provided
Proprietary object	-	None within the device
Proprietary properties	-	None within the device
Communication management	-	Not tested

Known issues	Comments	Level
1	Alarm state is set but Confirmed nor UnConfirmed event notification are not sent to devices from the Notification Class Recipient List	
2	Logging of value does not work and does not buffered the values of the referenced property. Note: Buffer size limited to 16.	
3	Request respond for NoRange is correct but a request ByTime return invalid results	
4	This service is not permitted for all type of objects. For instance Analog Input object cannot be created nor deleted but Schedule ones can for both ones.	

3.5 HMS Industrial Network AB (Vendor id: 486)

3.5.1 Model – Anybus BACnet/ModBus

This device has the profile: BACnet Gateway (B-GW)

Last tests: November 2015, the BIG-CA BACnet Golden Week PlugFest in Shenzhen.

Firmware:

Protocol revision / version:

Tested with PcVue beta 11.200018 on Windows 8.1

Test	Result	Comments
Browsing of device	OK	
ReadProperty	OK	
ReadPropertyMultiple	OK	
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	OK	
WritePropertyMultiple	-	Not tested
Time synchronization	-	Not tested
BBMD	-	Not tested
Foreign device	-	Not tested
EDE file	-	Not tested
List element management	-	Not tested
UnConf event notification	-	Not tested
Acknowledgment	-	Not tested
Trend logging	-	Not tested
Trend logging multiple	-	Not tested
Event logging	-	Not tested
ReadRange	-	Not tested
Event enrollment	-	Not tested
Schedulling	-	Not tested
Commanded actions	-	Not tested
File and program status	-	Not tested
Object creation	-	Not tested
Object deletion	-	Not tested
Backup and restore	-	Not tested
Cold restart	-	Not tested
Warm restart	-	Not tested
Proprietary object	-	Not tested
Proprietary properties	-	Not tested
Communication management	-	Not tested

3.6 LG Electronics (Vendor id: 432)

3.6.1 Model – ACP BACnet

This device has the profile: BACnet Application Specific Controller (B-ASC)


Last tests: May 2016, the BIG-EU BACnet PlugFest in Berne.

Firmware: 3.1.5

Protocol revision / version: 4/1

Tested with PcVue beta 11.2.3022.17414 on Windows 7

Test	Result	Comments
Browsing of device	OK	
ReadProperty	OK	
ReadPropertyMultiple	OK	
Cov subscription	OK	
UnCov subscription	OK	
WriteProperty	OK	
WritePropertyMultiple	OK	
Time synchronization	nOK	Warning: see known issues ¹
BBMD	-	Not tested
Foreign device	-	Not tested
EDE file		EDE_File_52204_EDE, EDE_File_52204_ObjTypes, EDE_Files_52204_StateTexts, EDE_Files_52204_Units
List element management	-	Not supported
UnConf event notification	-	Not supported
Acknowledgment	-	Not supported
Trend logging	-	Not supported
Trend logging multiple	-	Not supported
Event logging	-	Not supported
ReadRange	-	Not supported
Event enrollment	-	Not supported
Schedulling	-	Not supported
Commanded actions	-	Not supported
File and program status	-	Not supported
Object creation	-	Not supported
Object deletion	-	Not supported
Backup and restore	-	Not supported
Cold restart	-	Not supported
Warm restart	-	Not supported
Proprietary object	-	Not supported
Proprietary properties	-	Not supported
Communication management	-	Not tested

Known issues	Comments	Level
1	Local Time synchronisation supported correctly. However UTC Time Synchronisation set the Device time to a factory default (GMT+9).	

3.7 Quantum Automation (Vendor id: 398)

3.6.1 Model – iCON-3400BP

This device has the profile: (BACnet Advanced Application Controller (B-AAC)) or
This device works like a BACnet Device (Direct)


Last tests: 2016/07/04, Quantum Automation Singapore

Firmware: 6.05.00

Application Software version: 715.00

Tested with PcVue 11.2 5001 on Windows 8.1

Test	Result	Comments
Browsing of device	nOK	See known issues 1
ReadProperty	-	
ReadPropertyMultiple	-	
Cov subscription	-	
UnCov subscription	-	
WriteProperty	-	
WritePropertyMultiple	-	
Time synchronization	-	
BBMD	-	
Foreign device	-	
EDE file	-	
List element management	-	
UnConf event notification	-	
Acknowledgment	-	
Trend logging	-	
Trend logging multiple	-	
Event logging	-	
ReadRange	-	
Event enrolment	-	
Schedulling	-	
Commanded actions	-	
File and program status	-	
Object creation	-	
Object deletion	-	
Backup and restore	-	
Cold restart	-	
Warm restart	-	
Proprietary object	-	
Proprietary properties	-	

Known issues	Comments	Level
1	<p>Look into the RPM-Complex ACK for the reply to the "segmentation-supported". It has the wrong data type. I should be "enumerated" but it is "unsigned".</p> <pre> < Building Automation and Control Network NPDU Building Automation and Control Network APDU 0011 ... = APDU Type: Complex-ACK (3) ... 0000 = PDU Flags: 0x00 Invoke ID: 44 Service Choice: readPropertyMultiple (14) ObjectIdentifier: device, 24 ListOfResults {[1] Property Identifier: segmentation-supported (107) {[4] segmentation-supported: (Unsigned) 3 } Property Identifier: max-apdu-length-accepted (62) {[4] max-apdu-length-accepted: (Unsigned) 1024 } Property Identifier: max-segments-accepted (167) propertyAccessError {[5] </pre> <p>This results into the state machine trying to read those properties one after another starting with "segmentation-supported". Guess what happens. That device again sends the wrong data type "unsigned" and this leads the state machine to completely restart communication to the device.</p> <p>Indeed the BACnet standard specifies the datatype of the property "Segmentation_Supported" as a BACnetSegmentation enumeration as following:</p> <p><u>Extract of ASHRAE:</u></p> <pre> BACnetSegmentation := ENUMERATED { segmented-both (0), segmented-transmit (1), segmented-receive (2), no-segmentation (3) } </pre> <p><u>Solution:</u> issue with the firmware 6.05.00. The manufacturer has to fix the issue. Update firmware, ...</p>	

3.8 Regin AB (Vendor id: 264)

3.7.1 Model – EXO


Last tests: May 2016, the BIG-EU BACnet PlugFest in Berne.



Firmware:

Protocol revision / version:

Tested with PcVue beta 11.2.3022.17414 on Windows 10

Test	Result	Comments
Browsing of device	OK	
ReadProperty	OK	
ReadPropertyMultiple	OK	
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	OK	
WritePropertyMultiple	-	Not tested
Time synchronization	nOK	Warning: see known issues ¹
BBMD	-	Not supported
Foreign device	-	Not supported
EDE file	-	None available
List element management	nOK	Warning: see known issues ²
UnConf event notification	OK	
Acknowledgment	nOK	Warning: see known issues ³
Trend logging	-	Not supported
Trend logging multiple	-	Not supported
Event logging	-	Not supported
ReadRange	-	Not supported
Event enrollment	-	Not supported
Schedulling	OK	
Commanded actions	-	Not supported
File and program status	-	Not supported
Object creation	-	Not supported
Object deletion	-	Not supported
Backup and restore	-	Not supported
Cold restart	-	Not tested
Warm restart	-	Not tested
Proprietary object	-	Not tested
Proprietary properties	-	Not tested
Communication management	-	Not tested

Known issues	Comments	Level
1	Local Time synchronisation supported but does not support UTC Time synchronisation.	

2	Handled through Write Property. Also handle MAC Address in the Recipient List.	
3	Alarms can be acknowledge however Acked Transitions flags bit are not toggled accordingly.	

3.9 SAIA (Vendor id: 89)

3.8.1 Model – PCD3.M5560

This device has the profile: BACnet Building Controller (B-BC)


Last tests: May 2016, the BIG-EU BACnet PlugFest in Berne.

Firmware: 1.27.00.24.17

Protocol revision / version:

Tested with PcVue beta 11.2.3022.17414 on Windows 10

Test	Result	Comments
Browsing of device	OK	
ReadProperty	OK	
ReadPropertyMultiple	OK	
Cov subscription	OK	
UnCov subscription	OK	
WriteProperty	OK	
WritePropertyMultiple	OK	
Time synchronization	OK	
BBMD	-	Not tested
Foreign device	-	Not tested
EDE file	-	BACnet_V2_2_EDE, BACnet_V2_2_Object-Types, BACnet_V2_2_State-Texts, BACnet_V2_2_Units-Texts
List element management	OK	
UnConf event notification	OK	
Acknowledgment	OK	
Trend logging	OK	Warning: see known issues ¹
Trend logging multiple	-	Not supported
Event logging	OK	
ReadRange	OK	
Event enrollment	OK	
Schedulling	OK	
Commanded actions	OK	
File and program status	OK	
Object creation	-	Not supported
Object deletion	-	Not supported
Backup and restore	OK	
Cold restart	OK	
Warm restart	OK	
Proprietary object	-	Not supported
Proprietary properties	-	Not supported
Communication management	-	Not tested

Known issues	Comments	Level
1	Handle logging mechanism and buffer reset (Record Count set to 0) properly. However, if BufferSize is set to size under the current one,	

Record Count is not changed and a NoRange request will return all the logs up to this Record Count but not to the new BufferSize.

3.10 Sauter (Vendor id: 80)

3.9.1 Model – EY-RC504F011

This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2016, the BIG-EU BACnet PlugFest in Berne.

Firmware: 2.10.0

Protocol revision / version: 12/1

Tested with PcVue beta 11.2.3022.17414 on Windows 7

Test	Result	Comments
Browsing of device	OK	
ReadProperty	OK	
ReadPropertyMultiple	-	Not tested
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	-	Not tested
WritePropertyMultiple	-	Not tested
Time synchronization	OK	
BBMD	-	Not tested
Foreign device	-	Not tested
EDE file		edeDataText80100, edeStateText80100
List element management	-	Not tested
UnConf event notification	OK	
Acknowledgment	OK	
Trend logging	OK	
Trend logging multiple	-	Not tested
Event logging	OK	
ReadRange	OK	
Event enrollment	-	Not tested
Schedulling	-	Not tested
Commanded actions	OK	
File and program status	OK	
Object creation	-	Not tested
Object deletion	-	Not tested
Backup and restore	OK	
Cold restart	OK	
Warm restart	OK	
Proprietary object	OK	
Proprietary properties	OK	
Communication management	-	Not tested

3.11 Siemens (Vendor id: 9)

3.10.1 Model – PXC16.2-EF.A

This device has the profile: BACnet Building Controller (B-BC)


Last tests: November 2015, the BIG-CA BACnet Golden Week PlugFest in Shenzhen.

Firmware:

Protocol revision / version:

Tested with PcVue beta 11.200018 on Windows 8.1

Test	Result	Comments
Browsing of device	OK	
ReadProperty	OK	
ReadPropertyMultiple	OK	
Cov subscription	-	Not tested
UnCov subscription	-	Not tested
WriteProperty	OK	
WritePropertyMultiple	-	Not tested
Time synchronization	OK	
BBMD	OK	
Foreign device	OK	
EDE file	-	Not tested
List element management	-	Not tested
UnConf event notification	-	Not tested
Acknowledgment	-	Not tested
Trend logging	OK	
Trend logging multiple	-	Not tested
Event logging	-	Not tested
ReadRange	-	Not tested
Event enrollment	-	Not tested
Schedulling	OK	
Commanded actions	OK	
File and program status	OK	
Object creation	OK	
Object deletion	OK	
Backup and restore	-	Not tested
Cold restart	-	Not tested
Warm restart	-	Not tested
Proprietary object	-	Not tested
Proprietary properties	-	Not tested
Communication management	-	Not tested

Known issues	Comments	Level
1	Handled through Write service instead	

3.12 Trend (Vendor id: 91)

3.11.1 Model – IQ4NC

This device has the profile: BACnet Building Controller (B-BC)

Last tests: May 2016, the BIG-EU BACnet PlugFest in Berne.

Firmware: NC12 ISS 3.40 Alpha 6 May 16

Protocol revision / version: 15/1

Tested with PcVue beta 11.2.03022.17414 on Windows 7

Test	Result	Comments
Browsing of device	OK	
ReadProperty	OK	
ReadPropertyMultiple	OK	
Cov subscription	OK	
UnCov subscription	OK	
WriteProperty	OK	
WritePropertyMultiple	OK	
Time synchronization	OK	
BBMD	-	Not tested
Foreign device	-	Not tested
EDE file	-	None available
List element management	-	Not supported
UnConf event notification	-	Not tested
Acknowledgment	-	Not tested
Trend logging	-	Not tested
Trend logging multiple	-	Not tested
Event logging	-	Not tested
ReadRange	OK	
Event enrollment	-	Not tested
Schedulling	-	Not tested
Commanded actions	-	Not tested
File and program status	-	Not tested
Object creation	-	Not tested
Object deletion	-	Not tested
Backup and restore	-	Not tested
Cold restart	-	Not tested
Warm restart	-	Not tested
Proprietary object	-	Not supported
Proprietary properties	-	Not supported
Communication management	-	Not tested

4 General issues and solutions:

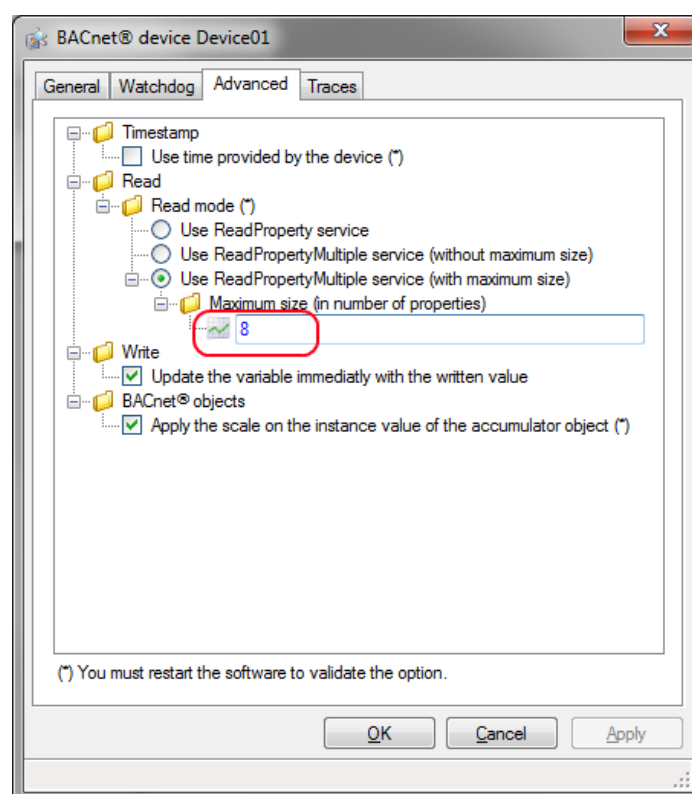
4.1 Segmentation is not supported:

Warning, this device doesn't support the segmentation. It is possible that the device is often disconnected by using the polling mode with readPropertyMultiple service. To know if the device supports the segmentation, it is possible to check the PICS document or check the wireshark logs (see below):

10.254.42.81	10.254.255.255	BACnet-APDU	Unconfirmed-Request : who-Is
10.254.42.81	10.254.42.35	BACnet-APDU	Confirmed-Request [invoke:1]: readPropertyMultiple
10.254.42.35	10.254.42.81	BACnet-APDU	Abort [invoke:7]: segmentation-not-supported
10.254.42.81	10.254.255.255	BACnet-APDU	Unconfirmed-Request : who-Is
10.254.42.81	10.254.255.255	BACnet-APDU	Unconfirmed-Request : who-Is

The BDS 2.10.0.5 doesn't switch automatically to the value defined in the "read multiple max length if segmentation is not supported" parameter in BdsAdmin. The number of items set in the advanced parameters of the device in PcVue is always priority.

To bypass this problem, it is necessary to adjust manually the number of items in the readPropertyMultiple request like below:



If the problem remains present, it can be necessary to decrease this value or select the ReadProperty mode.

4.2 The device doesn't answer always to the "ReadPropertyMultiple" requests sent by BDS:

Some devices don't always answer to the "ReadPropertyMultiple" requests sent by BDS when too many numbers of items is set in the request.

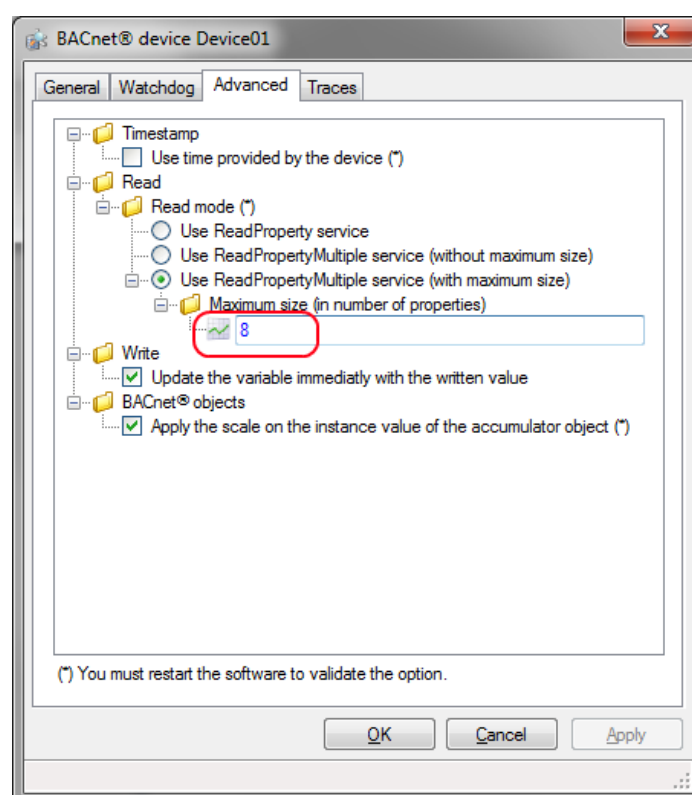
To identify this problem, it is necessary to check the wireshark logs (see below):

169.254.175.80	169.254.175.255	BACnet-APDU	Unconfirmed-Request : who-Is
169.254.175.4	169.254.175.3	BACnet-APDU	Confirmed-Request [invoke:66]: readPropertyMultiple
169.254.175.3	169.254.175.4	BACnet-APDU	ComplexACK [invoke:66]: readPropertyMultiple
169.254.175.4	169.254.175.3	BACnet-APDU	Confirmed-Request [invoke:227]: readPropertyMultiple
169.254.175.4	169.254.175.3	BACnet-APDU	Confirmed-Request [invoke:227]: readPropertyMultiple
169.254.175.4	169.254.175.3	BACnet-APDU	Confirmed-Request [invoke:67]: readPropertyMultiple
169.254.175.3	169.254.175.4	BACnet-APDU	ComplexACK [invoke:67]: readPropertyMultiple
169.254.175.4	169.254.175.3	BACnet-APDU	Confirmed-Request [invoke:228]: readPropertyMultiple
169.254.175.3	169.254.175.4	BACnet-APDU	ComplexACK [invoke:228]: readPropertyMultiple
169.254.175.4	169.254.175.3	BACnet-APDU	Confirmed-Request [invoke:68]: readPropertyMultiple
169.254.175.3	169.254.175.4	BACnet-APDU	ComplexACK [invoke:68]: readPropertyMultiple
169.254.175.4	169.254.175.3	BACnet-APDU	Confirmed-Request [invoke:229]: readPropertyMultiple
169.254.175.4	169.254.175.3	BACnet-APDU	Confirmed-Request [invoke:229]: readPropertyMultiple
169.254.175.3	169.254.175.4	BACnet-APDU	ComplexACK [invoke:69]: readPropertyMultiple
169.254.175.4	169.254.175.3	BACnet-APDU	Confirmed-Request [invoke:229]: readPropertyMultiple
169.254.175.80	169.254.175.255	BACnet-APDU	Unconfirmed-Request : who-Is
169.254.175.80	169.254.175.255	BACnet-APDU	Unconfirmed-Request : who-Is
169.254.175.80	169.254.175.255	BACnet-APDU	Unconfirmed-Request : who-Is
169.254.175.80	169.254.175.255	BACnet-APDU	Unconfirmed-Request : who-Is
169.254.175.80	169.254.175.255	BACnet-APDU	Unconfirmed-Request : who-Is

The wireshark logs indicate that the device is online but it doesn't send always a response as for the "invoke 227" request even after several retries of BDS.

In this case, the symptoms are the same as a device which doesn't support the segmentation. The device is often disconnected.

To bypass this issue, it is necessary to adjust manually the number of items in the readPropertyMultiple request like below:



If the problem remains present, it can be necessary to decrease this value or select the ReadProperty mode.

This issue has not still been targeted. Maybe the buffer memory size of the device is too small.

4.3 The Cov or uCov is supported by the device but that doesn't work:

The `protocol_services_supported` property indicates which standardized protocol services are executed by this device's protocol implementation (extract of ASHRAE 2010, p198).

BDS uses the `ConfirmedCovNotification` and `UnconfirmedCovNotification` flags contained in this property of distant device to know what cov services it can subscribe to the device. So for BDS, to subscribe with cov or ucov mode, the BACnet server must have the `ConfirmedCovNotification` or `UnconfirmedCovNotification` flags at TRUE, else, it considers that the device doesn't support the Cov.

And in fact, it is not what means the BACnet standard.

So, BDS can't communicate in Cov or uCov mode with a distant device which shows the configuration like below:

- `subscribeCOV` = TRUE
- `subscribeCOVProperty` = TRUE (or FALSE)
- `confirmedCOVNotification` = FALSE
- `unconfirmedCOVNotification` = FALSE

To identify this problem, it is necessary to check the wireshark logs and check the ReadProperty message containing the value of `protocol_services_supported` property of the distant device (see below):

This problem is fixed in PcVue v11, v10SP2 and v9.0SP3 (BDS 2.10.0.10 and next).

```

[-] protocol-services-supported: (Bit String)
  [-] Application Tag: Bit String, Length/Value/Type: 6
    .... 0... = Tag Class: Application Tag
    1000 .... = Application Tag Number: Bit String (8)
    .... .101 = Named Tag: Extended Value (5)
    Length Value Type: 6
    Unused bits: 0
    acknowledgeAlarm = TRUE
    confirmedCOVNotification = FALSE
    confirmedEventNotification = FALSE
    getAlarmSummary = FALSE
    getEnrollmentSummary = FALSE
    subscribeCOV = TRUE
    atomicReadFile = FALSE
    atomicWriteFile = TRUE
    addListElement = FALSE
    removeListElement = FALSE
    createObject = FALSE
    deleteObject = FALSE
    readProperty = TRUE
    readPropertyConditional = FALSE
    readPropertyMultiple = TRUE
    writeProperty = TRUE
    writePropertyMultiple = TRUE
    deviceCommunicationControl = TRUE
    confirmedPrivateTransfer = FALSE
    confirmedTextMessage = FALSE
    reinitializeDevice = TRUE
    vtOpen = FALSE
    vtClose = FALSE
    vtData = FALSE
    authenticate = FALSE
    requestKey = FALSE
    i-Am = TRUE
    i-Have = FALSE
    unconfirmedCOVNotification = FALSE
    unconfirmedEventNotification = FALSE
    unconfirmedPrivateTransfer = FALSE
    unconfirmedTextMessage = FALSE
    timeSynchronization = TRUE
    who-Has = TRUE
    who-Is = TRUE
    readRange = FALSE
    utcTimeSynchronization = TRUE
    lifeSafetyOperation = FALSE
    subscribeCOVProperty = TRUE
    getEventInformation = TRUE
  
```

Warning, according to that information PcVue uses a callback mechanism and changes to polling mode for the data points that it is interested in.
So, the Cov or uCov mode is not used (check wireshark logs).

To bypass this problem, it is necessary to apply a specific patch for BDS v2.10.0.5 (provided for 10.0SP1 only).

For the next version, the BDS driver should be able to manage automatically the Cov and uCov mode with devices like this one.

4.4 Cov or uCov mapping on object level

Problem with Cov or uCov mapping on object level. All present-value and status-flags are subscribed. But some devices allow subscription in COV to present-value but not to status-flag property (*probably because the SubscribeCov is supported but SubscribeCovProperty service is not supported*).

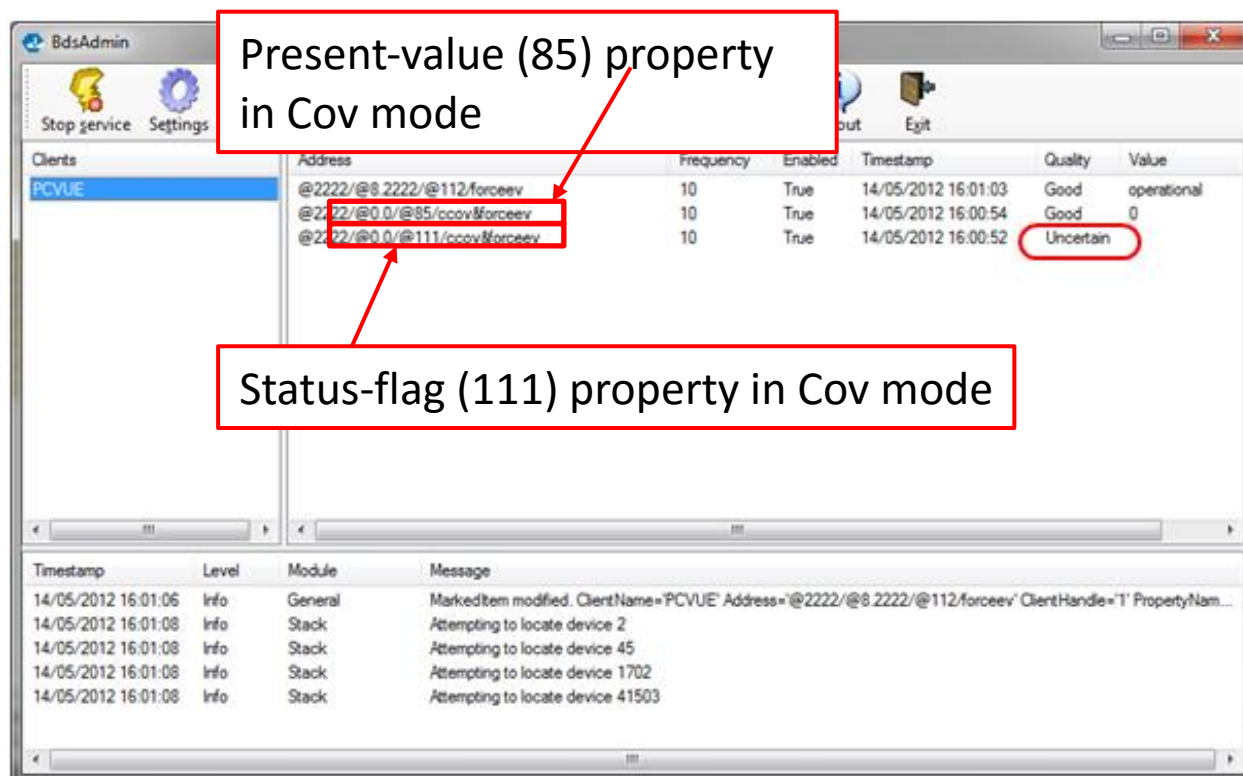
The SubscribeCovProperty service is not supported and it should not be necessary to work because for each notification of present-value change, the value of status-flag is contained in the message (see below the extract of Wireshark logs):

```

Frame 160 (85 bytes on wire, 85 bytes captured)
+ Ethernet II, Src: Elesta_09:6d:26 (00:17:74:09:6d:26), Dst: Vmware_f2:fa:3b (00:0c:29:f2:fa:3b)
+ Internet Protocol, Src: 192.168.8.10 (192.168.8.10), Dst: 192.168.3.27 (192.168.3.27)
+ User Datagram Protocol, Src Port: bacnet (47808), Dst Port: bacnet (47808)
+ BACnet Virtual Link Control
+ Building Automation and Control Network NPDU
- Building Automation and Control Network APDU
  0000 .... = APDU Type: Confirmed-Request (0)
  + .... 0000 = PDU Flags: 0x00
  .000 .... = Max Response Segments accepted: Unspecified (0)
  .... 0101 = Size of Maximum ADPU accepted: Up to 1476 octets (fits in an ISO 8802-3 frame) (5)
  Invoke ID: 6
  Service Choice: confirmedCOVNotification (1)
  ProcessIdentifier: 1
  + ObjectIdentifier: device object, 10
  + ObjectIdentifier: analog-value object, 100
  + Time remaining (hh.mm.ss): 2.00.00
  - list of values
    + Opening Tag: 4
    + Property Identifier: present-value (85)
    + propertyvalue
    + Property Identifier: status-flags (111)
    + propertyvalue
    + Closing Tag: 4
  
```

It is also possible to see this problem from the BdsAdmin interface. The status-flags property (number 111) keeps the status "Uncertain".

This problem is fixed in PcVue v11, v10SP2 and v9.0SP3 (BDS 2.10.0.10 and next). But that will work never for variables mapped on object level and if the timestamp provided by the device is enabled. In fact, the BACnet notification sent on object level doesn't contain the device timestamp and it won't be possible to do mapping by Cov with timestamp provided by the device if the distant device doesn't support the SubscribeCov and SubscribeCovProperty.



In this case, the Cov or uCov mapping on BACnet object level is not possible. To bypass this issue, it is necessary to switch to polling mode.

4.5 Polling is not optimized

When PcVue map a variable to a BACnet instance (on object level) by using the polling mode, PcVue reads the value of present-value property and the content of status-flag property in 2 "listOfPropertyReferences" (see the extract of wireshark logs).

```

34 2012-05-02 14:45:16.046246 192.168.5.3 192.168.3.27 BACnet-APDU Sim
+ Frame 22 (92 bytes on wire, 92 bytes captured)
+ Ethernet II, Src: Vmware_f2:fa:3b (00:0c:29:f2:fa:3b), Dst: Beckhoff_0e:31:19 (00:01:05:0e:31:19)
+ Internet Protocol, Src: 192.168.3.27 (192.168.3.27), Dst: 192.168.5.3 (192.168.5.3)
+ User Datagram Protocol, Src Port: bacnet (47808), Dst Port: bacnet (47808)
+ BACnet Virtual Link Control
+ Building Automation and Control Network NPDU
+ Building Automation and Control Network APDU
  0000 .... = APDU Type: Confirmed-Request (0)
  + .... 0010 = PDU Flags: 0x02
    .111 .... = Max Response Segments accepted: Greater than 64 segments (7)
    .... 0101 = Size of Maximum ADPU accepted: Up to 1476 octets (fits in an ISO 8802-3 frame) (5)
  Invoke ID: 225
  Service Choice: readPropertyMultiple (14)
  + ObjectIdentifier: analog-output object, 0
  + listOfPropertyReferences
    + Opening Tag: 1
    + Property Identifier: present-value (85)
    + Property Identifier: status-flags (111)
    + Closing Tag: 1
  + ObjectIdentifier: analog-output object, 0
  + listOfPropertyReferences
    + Opening Tag: 1
    + Property Identifier: status-flags (111)
    + Closing Tag: 1
  + ObjectIdentifier: analog-value object, 0
  + listOfPropertyReferences
    + ObjectIdentifier: device object, 41503
    + listOfPropertyReferences

```

BDS driver doesn't provide a method to get the status-flag automatically in the same "listOfPropertyReferences" as the "present-value". So PcVue has to build a second "listOfPropertyReferences" to read the status-flag.

The supplementary layer of BDS prevents the optimized communication with BACnet devices.

This problem could affect the performance but there is a solution.

This problem is fixed in PcVue v11, v10SP2 and v9.0SP3 (BDS 2.10.0.10 and next).

4.6 Scan is not performance

During the scan, the device is not able to answer to the "ReadPropertyMultiple" request with the parameter "all". The response is an error.

So, the browsing is not performance because the BDS has to switch to readProperty mechanism for reading each property defined in the BACnet standard for each BACnet object configured in the device.

32	2012-10-26 10:27:56.232968	200.100.2.50	200.100.2.1	BACnet-APDU	ComplexACK [invoke:1]: readProperty
33	2012-10-26 10:27:56.237852	200.100.2.1	200.100.2.50	BACnet-APDU	SegmentACK
34	2012-10-26 10:27:56.252855	200.100.2.1	200.100.2.50	BACnet-APDU	Confirmed-Request [invoke:8]: readPropertyMultiple
35	2012-10-26 10:27:56.255051	200.100.2.50	200.100.2.1	BACnet-APDU	Error [invoke:8]: readPropertyMultiple
36	2012-10-26 10:27:56.264893	200.100.2.1	200.100.2.50	BACnet-APDU	Confirmed-Request [invoke:9]: readProperty
37	2012-10-26 10:27:56.264935	200.100.2.1	200.100.2.50	BACnet-APDU	Confirmed-Request [invoke:10]: readProperty
38	2012-10-26 10:27:56.264960	200.100.2.1	200.100.2.50	BACnet-APDU	Confirmed-Request [invoke:11]: readProperty
39	2012-10-26 10:27:56.264984	200.100.2.1	200.100.2.50	BACnet-APDU	Confirmed-Request [invoke:12]: readProperty
40	2012-10-26 10:27:56.265009	200.100.2.1	200.100.2.50	BACnet-APDU	Confirmed-Request [invoke:13]: readProperty
41	2012-10-26 10:27:56.265035	200.100.2.1	200.100.2.50	BACnet-APDU	Confirmed-Request [invoke:14]: readProperty
42	2012-10-26 10:27:56.265060	200.100.2.1	200.100.2.50	BACnet-APDU	Confirmed-Request [invoke:15]: readProperty

Frame 34 (61 bytes on wire, 61 bytes captured)	
Ethernet II, Src: Supermic_b3:64:0a (00:30:48:b3:64:0a), Dst: Trane_00:b8:d2 (00:12:ea:00:b8:d2)	
Internet Protocol, Src: 200.100.2.1 (200.100.2.1), Dst: 200.100.2.50 (200.100.2.50)	
User Datagram Protocol, Src Port: bacnet (47808), Dst Port: bacnet (47808)	
BACnet Virtual Link Control	
Building Automation and Control Network NPDU	
Building Automation and Control Network APDU	
0000 = APDU type: Confirmed-Request (0)	
.... 0010 = PDU Flags: 0x02	
.111 = Max Response Segments accepted: Greater than 64 segments (7)	
.... 0011 = Size of Maximum ADPU accepted: up to 480 octets (fits in an ARCNET frame) (3)	
Invoke ID: 8	
Service Choice: readPropertyMultiple (14)	
ObjectIdentifier: analog-input object, 1	
ListOfPropertyReferences	
Opening Tag: 1	
Property Identifier: all (8)	
Closing Tag: 1	

The scan works but can be very long time.

4.7 No Cov for specific properties

When a device supports the Cov, that doesn't mean it is possible to use the Cov with all properties.

The BACnet standard defines two types of Cov:

- SubscribeCov: this service is generally available to get the "present-value" value if this property is defined for the object. In fact, this service should be used on the object level because it allows get several values of properties of object in a notification message. But BDS uses this when we map the "present-value" property of 'analog-value' object, for example.
- SubscribeCovProperty: this service is used to get a value of specific property of BACnet object,

To identify if the device supports the SubscribeCov or SubscribeCovProperty, it is necessary to check the PICS or the value of protocol_services_supported property of "device" object (see below):

```

1090 2012-11-2 192.168.10. 192.168.10.10 BACnet-APDU ComplexACK [invoke:224]: readProperty
1091 2012-11-2 192.168.10. 192.168.10.56 BACnet-APDU Confirmed-Request [invoke:225]: readPr
1092 2012-11-2 192.168.10. 192.168.10.10 BACnet-APDU ComplexACK [invoke:225]: readProperty
1093 2012-11-2 192.168.10. 192.168.10.56 BACnet-APDU Unconfirmed-Request [invoke:225]: readPr

... 0000 = FDU Flags: 0x00
  Invoke ID: 224
  Service Choice: readProperty (12)
  ObjectIdentifier: device object, 1016
  Property Identifier: protocol-services-supported (97)
  PropertyValue
    Opening Tag: 3
    protocol-services-supported: (Bit String)
      Application Tag: Bit String, Length/value/Type: 6
      Unused bits: 0
      acknowledgeAlarm = FALSE
      confirmedCOVNotification = FALSE
      confirmedEventNotification = FALSE
      getAlarmSummary = FALSE
      getEnrollmentSummary = FALSE
      subscribeCOV = TRUE
      atomicReadFile = FALSE
      atomicWriteFile = FALSE
      addListElement = FALSE
      removeListElement = FALSE
      createObject = FALSE
      deleteObject = FALSE
      readProperty = TRUE
      readPropertyConditional = FALSE
      readPropertyMultiple = TRUE
      writeProperty = TRUE
      writePropertyMultiple = TRUE
      deviceCommunicationControl = TRUE
      confirmedPrivateTransfer = FALSE
      confirmedTextMessage = FALSE
      reinitializeDevice = FALSE
      vtOpen = FALSE
      vtClose = FALSE
      vtData = FALSE
      authenticate = FALSE
      requestKey = FALSE
      i-Am = TRUE
      i-Have = FALSE
      unconfirmedCOVNotification = FALSE
      unconfirmedEventNotification = FALSE
      unconfirmedPrivateTransfer = FALSE
      unconfirmedTextMessage = FALSE
      timesSynchronization = TRUE
      who-Has = TRUE
      who-Is = TRUE
      readRange = TRUE
      utcTimesSynchronization = TRUE
      lifesafetyoperation = FALSE
      subscribeCOVProperty = FALSE
      getEventInformation = TRUE

```

If the Cov is used, it is important to check with Wireshark if BDS has great subscribed to the variable because BDS includes a mechanism to switch automatically to polling if the Cov is not supported. In this case, the BACnet item is read but PcVue doesn't use the monitoring type selected.

This description is applicable for uCov.

4.8 Checking of Cov limitation

Each device has probably a limit of Cov subscriptions. The limit of some devices is little and sometimes, it is necessary to know it to select the properties which have to be monitored by Cov or uCov.

The manufacturer should be able to indicate the limit of subscription Cov but if it is unknown, in this case, there is not another solution that to check this by mapping variables in Cov mode.

If the limitation is known, you have to envisage that one second server can subscribe to the Cov variable although the main server has always subscribed (example if the one sever turn off-line).




It is possible to check in the limitation of subscriptions has been "dépassé" by checking the wireshark logs. The distant device acknowledges the subscription message by sending a message with an error code:

NO_SPACE_TO_ADD_LIST_ELEMENT: *No context can be created due to resource limitations*

8834	2012-11-2	192.168.10.11	192.168.10.56	BACnet-APDU	Confirmed-Request [invoke:112]: subscribeCOV
8835	2012-11-2	192.168.10.56	192.168.10.11	BACnet-APDU	Error [invoke:112]: subscribeCOV
8836	2012-11-2	192.168.10.11	192.168.10.56	BACnet-APDU	Confirmed-Request [invoke:113]: subscribeCOV
8837	2012-11-2	192.168.10.64	192.168.10.10	BACnet-APDU	Confirmed-Request [invoke:44]: confirmedCOVNotif
8838	2012-11-2	192.168.10.59	192.168.10.10	BACnet-APDU	Confirmed-Request [invoke:59]: confirmedCOVNotif
8839	2012-11-2	192.168.10.59	192.168.10.10	BACnet-APDU	Confirmed-Request [invoke:60]: confirmedCOVNotif
8840	2012-11-2	192.168.10.63	192.168.10.10	BACnet-APDU	Confirmed-Request [invoke:104]: confirmedCOVNotif
8841	2012-11-2	192.168.10.55	192.168.10.11	BACnet-APDU	Error [invoke:57]: subscribeCOV

Frame 8835 (60 bytes on wire, 60 bytes captured)	
Ethernet II, Src: Caradont_00:a2:a9 (00:10:70:00:a2:a9), Dst: 78:2b:cb:aa:ae:3f (78:2b:cb:aa:ae:3f)	
Internet Protocol, Src: 192.168.10.56 (192.168.10.56), Dst: 192.168.10.11 (192.168.10.11)	
User Datagram Protocol, Src Port: bacnet (47808), Dst Port: bacnet (47808)	
BACnet Virtual Link Control	
Building Automation and Control Network NPDU	
Building Automation and Control Network APDU	
0101 = APDU Type: Error (5)	
Invoke ID: 112	
Service Choice: subscribeCOV (5)	
error class: resources	
error Code: no-space-to-add-list-element	

4.9 The automatic subscription to alarms&events doesn't work

Device01				
Name	Description	Object identifier	State	
 HIGH		2	Check the notification-class	
 LOW		3	Check the notification-class	
 URGENT		1	Check the notification-class	

Some device supports the intrinsic reporting feature but it is not possible to subscribe to the notification-class objects. In fact, some device doesn't support AddListElement and RemoveListElement services. If the device supports the intrinsic reporting, in this case, it will be probably necessary to use the third-part tool provided by the manufacturer to register manually PcVue in the *recipient-list* properties of different *notification-class* objects.

```

- ...
- protocol-services-supported: (Bit String)
  + Application Tag: Bit String, Length/Value/Type: 6
    Unused bits: 0
    acknowledgeAlarm = TRUE
    confirmedCOVNotification = TRUE
    confirmedEventNotification = TRUE
    getAlarmSummary = TRUE
    getEnrollmentsSummary = TRUE
    subscribeCOV = TRUE
    atomicReadFile = TRUE
    atomicWriteFile = TRUE
    addListElement = FALSE
    removeListElement = FALSE
    createObject = TRUE
    deleteObject = TRUE
    readProperty = TRUE
    readPropertyConditional = FALSE
    readPropertyMultiple = TRUE
    writeProperty = TRUE
    writePropertyMultiple = TRUE
    deviceCommunicationControl = TRUE
    confirmedPrivateTransfer = TRUE
    confirmedTextMessage = FALSE
    reinitializeDevice = TRUE
    vtOpen = FALSE
    vtClose = FALSE
    vtData = FALSE
    authenticate = FALSE
    requestKey = FALSE
    i-Am = TRUE
    i-Have = TRUE
    unconfirmedCOVNotification = TRUE
    unconfirmedEventNotification = TRUE
    unconfirmedPrivateTransfer = TRUE
    unconfirmedTextMessage = FALSE
    timesynchronization = TRUE
    who-Has = TRUE
    who-Is = TRUE
    readRange = TRUE
    utcTimesynchronization = FALSE
    lifeSafetyOperation = FALSE
    subscribeCOVProperty = TRUE
    getEventInformation = TRUE
  + }[3]
  
```

4.11 EDE file example

# Proposal_Engineering-Data-Exchange - B.I.G.-EU					
PROJECT_NAME	EDEexample				
VERSION_OF_REFERENCEFILE	1				
TIMESTAMP_OF_LAST_CHANGE	19/ Dez/ 2005				
AUTHOR_OF_LAST_CHANGE	G. Sampler				
VERSION_OF_LAYOUT	2.1				
#mandatory	mandatory	mandatory	mandatory	mandatory	optional
# keyname	device obj.-instance	object-name	object-type	object-instance	description
Building03Room15Temperature	10	RoomTemperature	0	4123	This is a Room Temperature
Building03Room15DamperPosition	10	Damper	1	1234	Damper in Duct 2
Building03Room15Damper	10	Damper	2	1111	Raw Value Damper
Building03Room15	10	ASB03R15	8	10	Controller10
Building17Room01WindowStatus	12	Window	3	4711	Window Contact
Building17Room01FanMode	12	Fan	14	4711	Fan
Building17Room01Temperature	12	RoomTemperature	0	1000	This is a Room Temperature
Building17Room01	12	ASB17R01	8	12	Controller12

5 Annex:

5.1 BACnet vendor ids

The screenshot shows a window titled "BACnet® device details". It contains several text input fields with the following values:

- MAC address: 192-168-59-111-186-192
- Vendor Name: Newron System
- Vendor Identifier: 451** (highlighted with a red rectangle)
- Application software version: 1.0
- Object name: DEV 0
- Model name: Newron System Engine
- Firmware revision: 1.0.0

An "OK" button is located at the bottom right of the dialog.

Vendor id	Organization
0	ASHRAE
1	NIST
2	The Trane Company
3	McQuay International
4	PolarSoft
5	Johnson Controls, Inc.
6	American Auto-Matrix
7	Siemens Building Technologies, Ltd., Landis & Staefa Division Europe
8	Delta Controls
9	Siemens Building Technologies, Inc.
10	Tour Andover Controls Corporation
11	TAC
12	Orion Analysis Corporation
13	Teletrol Systems Inc.
14	Cimetrics Technology
15	Cornell University
16	United Technologies Carrier
17	Honeywell Inc.
18	Alerton / Honeywell
19	TAC AB
20	Hewlett-Packard Company
21	Dorsette's Inc.
22	Cerberus AG

23	York Controls Group
24	Automated Logic Corporation
25	CSI Control Systems International
26	Phoenix Controls Corporation
27	Innovex Technologies, Inc.
28	KMC Controls, Inc.
29	Xn Technologies, Inc.
30	Hyundai Information Technology Co., Ltd.
31	Tokimec Inc.
32	Simplex
33	North Building Technologies Limited
34	Notifier
35	Reliable Controls Corporation
36	Tridium Inc.
37	Sierra Monitor Corporation/FieldServer Technologies
38	Silicon Energy
39	Kieback & Peter GmbH & Co KG
40	Anacon Systems, Inc.
41	Systems Controls & Instruments, LLC
42	Lithonia Lighting
43	Micropower Manufacturing
44	Matrix Controls
45	METALAIRE
46	ESS Engineering
47	Sphere Systems Pty Ltd.
48	Walker Technologies Corporation
49	H I Solutions, Inc.
50	MBS GmbH
51	SAMSON AG
52	Badger Meter Inc.
53	DAIKIN Industries Ltd.
54	NARA Controls Inc.
55	Mammoth Inc.
56	Liebert Corporation
57	SEMCO Incorporated
58	Air Monitor Corporation
59	TRIATEK, LLC
60	NexLight
61	Multistack
62	TSI Incorporated
63	Weather-Rite, Inc.
64	Dunham-Bush
65	Reliance Electric
66	LCS Inc.
67	Regulator Australia PTY Ltd.
68	Touch-Plate Lighting Controls
69	Amann GmbH

70	RLE Technologies
71	Cardkey Systems
72	SECOM Co., Ltd.
73	ABB Gebäudetechnik AG Bereich NetServ
74	KNX Association cvba
75	Institute of Electrical Installation Engineers of Japan (IEIEJ)
76	Nohmi Bosai, Ltd.
77	Carel S.p.A.
78	AirSense Technology, Inc.
79	Hochiki Corporation
80	Fr. Sauter AG
81	Matsushita Electric Works, Ltd.
82	Mitsubishi Electric Corporation, Inazawa Works
83	Mitsubishi Heavy Industries, Ltd.
84	ITT Bell & Gossett
85	Yamatake Building Systems Co., Ltd.
86	The Watt Stopper, Inc.
87	Aichi Tokei Denki Co., Ltd.
88	Activation Technologies, LLC
89	Saia-Burgess Controls, Ltd.
90	Hitachi, Ltd.
91	Novar Corp./Trend Control Systems Ltd.
92	Mitsubishi Electric Lighting Corporation
93	Argus Control Systems, Ltd.
94	Kyuki Corporation
95	Richards-Zeta Building Intelligence, Inc.
96	Scientech R&D, Inc.
97	VCI Controls, Inc.
98	Toshiba Corporation
99	Mitsubishi Electric Corporation Air Conditioning & Refrigeration Systems Works
100	Custom Mechanical Equipment, LLC
101	ClimateMaster
102	ICP Panel-Tec, Inc.
103	D-Tek Controls
104	NEC Engineering, Ltd.
105	PRIVA BV
106	Meidensha Corporation
107	JCI Systems Integration Services
108	Freedom Corporation
109	Neuberger Gebäudeautomation GmbH
110	Sitronix
111	Leviton Manufacturing
112	Fujitsu Limited
113	Emerson Network Power
114	S. A. Armstrong, Ltd.
115	Visonet AG
116	M&M Systems, Inc.

117	Custom Software Engineering
118	Nittan Company, Limited
119	Elutions Inc. (Wizcon Systems SAS)
120	Pacom Systems Pty., Ltd.
121	Unico, Inc.
122	Ebtron, Inc.
123	Scada Engine
124	AC Technology Corporation
125	Eagle Technology
126	Data Aire, Inc.
127	ABB, Inc.
128	Transbit Sp. z o. o.
129	Toshiba Carrier Corporation
130	Shenzhen Junzhi Hi-Tech Co., Ltd.
131	Tokai Soft
132	Blue Ridge Technologies
133	Veris Industries
134	Centaurus Prime
135	Sand Network Systems
136	Regulvar, Inc.
137	AFDtek Division of Fastek International Inc.
138	PowerCold Comfort Air Solutions, Inc.
139	I Controls
140	Viconics Electronics, Inc.
141	Yaskawa America, Inc.
142	DEOS control systems GmbH
143	Digitale Mess- und Steuersysteme AG
144	Fujitsu General Limited
145	Project Engineering S.r.l.
146	Sanyo Electric Co., Ltd.
147	Integrated Information Systems, Inc.
148	Temco Controls, Ltd.
149	Airtek International Inc.
150	Advantech Corporation
151	Titan Products, Ltd.
152	Regel Partners
153	National Environmental Product
154	Unitec Corporation
155	Kanden Engineering Company
156	Messner Gebäudetechnik GmbH
157	Integrated.CH
158	EH Price Limited
159	SE-Elektronik GmbH
160	Rockwell Automation
161	Enflex Corp.
162	ASI Controls
163	SysMik GmbH Dresden

164	HSC Regelungstechnik GmbH
165	Smart Temp Australia Pty. Ltd.
166	Cooper Controls
167	Duksan Mecasys Co., Ltd.
168	Fuji IT Co., Ltd.
169	Vacon Plc
170	Leader Controls
171	Cylon Controls, Ltd.
172	Compas
173	Mitsubishi Electric Building Techno-Service Co., Ltd.
174	Building Control Integrators
175	ITG Worldwide (M) Sdn Bhd
176	Lutron Electronics Co., Inc.
178	LOYTEC Electronics GmbH
179	ProLon
180	Mega Controls Limited
181	Micro Control Systems, Inc.
182	Kiyon, Inc.
183	Dust Networks
184	Advanced Building Automation Systems
185	Hermos AG
186	CEZIM
187	Softing
188	Lynxspring
189	Schneider Toshiba Inverter Europe
190	Danfoss Drives A/S
191	Eaton Corporation
192	Matyca S.A.
193	Botech AB
194	Noveo, Inc.
195	AMEV
196	Yokogawa Electric Corporation
197	GFR Gesellschaft für Regelungstechnik
198	Exact Logic
199	Mass Electronics Pty Ltd dba Innotech Control Systems Australia
200	Kandenko Co., Ltd.
201	DTF, Daten-Technik Fries
202	Klimasoft, Ltd.
203	Toshiba Schneider Inverter Corporation
204	Control Applications, Ltd.
205	KDT Systems Co., Ltd.
206	Onicon Incorporated
207	Automation Displays, Inc.
208	Control Solutions, Inc.
209	Remsdaq Limited
210	NTT Facilities, Inc.
211	VIPA GmbH

212	TSC21 Association of Japan
213	Strato Automation
214	HRW Limited
215	Lighting Control & Design, Inc.
216	Mercy Electronic and Electrical Industries
217	Samsung SDS Co., Ltd
218	Impact Facility Solutions, Inc.
219	Aircuity
220	Control Techniques, Ltd.
221	OpenGeneral Pty., Ltd.
222	WAGO Kontakttechnik GmbH & Co. KG
223	Cerus Industrial
224	Chloride Power Protection Company
225	Computrols, Inc.
226	Phoenix Contact GmbH & Co. KG
227	Grundfos Management A/S
228	Ridder Drive Systems
229	Soft Device SDN BHD
230	Integrated Control Technology Limited
231	AIRxpert Systems, Inc.
232	Microtrol Limited
233	Red Lion Controls
234	Digital Electronics Corporation
235	Ennovatis GmbH
236	Serotonin Software Technologies, Inc.
237	LS Industrial Systems Co., Ltd.
238	Square D Company
239	S Squared Innovations, Inc.
240	Aricent Ltd.
241	EtherMetrics, LLC
242	Industrial Control Communications, Inc.
243	Paragon Controls, Inc.
244	A. O. Smith Corporation
245	Contemporary Control Systems, Inc.
246	Intesis Software SL
247	Ingenieurgesellschaft N. Hartleb mbH
248	Heat-Timer Corporation
249	Ingrasys Technology, Inc.
250	Costerm Building Automation
251	WILO SE
252	Embedia Technologies Corp.
253	Technilog
254	HR Controls Ltd. & Co. KG
255	Lennox International, Inc.
256	RK-Tec Rauchklappen-Steuerungssysteme GmbH & Co. KG
257	Thermomax, Ltd.
258	ELCON Electronic Control, Ltd.

259	Larmia Control AB
260	BACnet Stack at SourceForge
261	G4S Security Services A/S
262	Exor International S.p.A.
263	Cristal Controles
264	Regin AB
265	Dimension Software, Inc.
266	SynapSense Corporation
267	Beijing Nantree Electronic Co., Ltd.
268	Camus Hydronics Ltd.
269	Kawasaki Heavy Industries, Ltd.
270	Critical Environment Technologies
271	ILSHIN IBS Co., Ltd.
272	ELESTA Energy Control AG
273	KROPMAN Installatietechnik
274	Baldor Electric Company
275	INGA mbH
276	GE Consumer & Industrial
277	Functional Devices, Inc.
278	ESAC
279	M-System Co., Ltd.
280	Yokota Co., Ltd.
281	Hitranse Technology Co., LTD
282	Federspiel Controls
283	Kele, Inc.
284	Opera Electronics, Inc.
285	Gentec
286	Embedded Science Labs, LLC
287	Parker Hannifin Corporation
288	MaCaPS International Limited
289	Link4 Corporation
290	Romutec Steuer-u. Regelsysteme GmbH
291	Pribusin, Inc.
292	Advantage Controls
293	Critical Room Control
294	LEGRAND
295	Tongdy Control Technology Co., Ltd.
296	ISSARO Integrierte Systemtechnik
297	Pro-Dev Industries
298	DRI-STEEM
299	Creative Electronic GmbH
300	Swegon AB
301	Jan Brachacek
302	Hitachi Appliances, Inc.
303	Real Time Automation, Inc.
304	ITEC Hankyu-Hanshin Co.
305	Cyrus E&M Engineering Co., Ltd.

306	Racine Federated, Inc.
307	Cirrascale Corporation
308	Elesta GmbH Building Automation
309	Securiton
310	OSIsoft, Inc.
311	Hanazeder Electronic GmbH
312	Honeywell Security Deutschland, Novar GmbH
313	Siemens Energy & Automation, Inc.
314	ETM Professional Control GmbH
315	Meitav-tec, Ltd.
316	Janitza Electronics GmbH
317	MKS Nordhausen
318	De Gier Drive Systems B.V.
319	Cypress Envirosystems
320	SMARTron s.r.o.
321	Verari Systems, Inc.
322	K-W Electronic Service, Inc.
323	ALFA-SMART Energy Management
324	Telkonet, Inc.
325	Securiton GmbH
326	Cemtrex, Inc.
327	Performance Technologies, Inc.
328	Xtralis (Aust) Pty Ltd
329	TROX GmbH
330	Beijing Hysine Technology Co., Ltd
331	RCK Controls, Inc.
332	Distech Controls SAS
333	Novar/Honeywell
334	The S4 Group, Inc.
335	Schneider Electric
336	LHA Systems
337	GHM engineering Group, Inc.
338	Climalux S.A.
339	VAISALA Oyj
340	COMPLEX (Beijing) Technology, Co., LTD.
341	SCADAmetrics
342	POWERPEG NSI Limited
343	BACnet Interoperability Testing Services, Inc.
344	Teco a.s.
345	Plexus Technology, Inc.
346	Energy Focus, Inc.
347	Powersmiths International Corp.
348	Nichibei Co., Ltd.
349	HKC Technology Ltd.
350	Ovation Networks, Inc.
351	Setra Systems
352	AVG Automation

353	ZXC Ltd.
354	Byte Sphere
355	Generiton Co., Ltd.
356	Holter Regelarmaturen GmbH & Co. KG
357	Bedford Instruments, LLC
358	Standair Inc.
359	WEG Automation - R&D
360	Prolon Control Systems ApS
361	Inneasoft
362	ConneXSoft GmbH
363	CEAG Notlichtsysteme GmbH
364	Distech Controls Inc.
365	Industrial Technology Research Institute
366	ICONICS, Inc.
367	IQ Controls s.c.
368	OJ Electronics A/S
369	Rolbit Ltd.
370	Synapsys Solutions Ltd.
371	ACME Engineering Prod. Ltd.
372	Zener Electric Pty, Ltd.
373	Selectronix, Inc.
374	Gorbet & Banerjee, LLC.
375	IME
376	Stephen H. Dawson Computer Service
377	Accutrol, LLC
378	Schneider Elektronik GmbH
379	Alpha-Inno Tec GmbH
380	ADMMicro, Inc.
381	Greystone Energy Systems, Inc.
382	CAP Technologie
383	KeRo Systems
384	Domat Control System s.r.o.
385	Efektronics Pty. Ltd.
386	Hekatron Vertriebs GmbH
387	Securiton AG
388	Carlo Gavazzi Controls SpA
389	Chipkin Automation Systems
390	Savant Systems, LLC
391	Simmtronic Lighting Controls
392	Abelko Innovation AB
393	Seresco Technologies Inc.
394	IT Watchdogs
395	Automation Assist Japan Corp.
396	Thermokon Sensortechnik GmbH
397	EGauge Systems, LLC
398	Quantum Automation (ASIA) PTE, Ltd.
399	Toshiba Lighting & Technology Corp.

400	SPIN Engenharia de Automação Ltda.
401	Logistics Systems & Software Services India PVT. Ltd.
402	Delta Controls Integration Products
403	Focus Media
404	LUMEnergi Inc.
405	Kara Systems
406	RF Code, Inc.
407	Fatek Automation Corp.
408	JANDA Software Company, LLC
409	Open System Solutions Limited
410	Intelec Systems PTY Ltd.
411	Ecolodgix, LLC
412	Douglas Lighting Controls
413	iSAtech GmbH intelligente Sensoren Aktoren technologie
414	AREAL
415	Beckhoff Automation GmbH
416	IPAS GmbH
417	KE2 Therm Solutions
418	Base2Products
419	DTL Controls, LLC
420	INNCOM International, Inc.
421	BTR Netcom GmbH
422	Greentrol Automation, Inc
423	BELIMO Automation AG
424	Samsung Heavy Industries Co, Ltd
425	Triacta Power Technologies, Inc.
426	Globestar Systems
427	MLB Advanced Media, LP
428	SWG Stuckmann Wirtschaftliche Gebäudesysteme GmbH
429	SensorSwitch
430	Multitek Power Limited
431	Aquametro AG
432	LG Electronics Inc.
433	Electronic Theatre Controls, Inc.
434	Mitsubishi Electric Corporation Nagoya Works
435	Delta Electronics, Inc.
436	Elma Kurtalj, Ltd.
437	ADT Fire and Security Sp. A.o.o.
438	Nedap Security Management
439	ESC Automation Inc.
440	DSP4YOU Ltd.
441	GE Sensing and Inspection Technologies
442	Embedded Systems SIA
443	BEFEGA GmbH
444	Baseline Inc.
445	M2M Systems Integrators
446	OEMCtrl

447	Clarkson Controls Limited
448	Rogerwell Control System Limited
449	SCL Elements
450	Hitachi Ltd.
451	Newron System SA
452	BEVECO Gebouwautomatisering BV
453	Streamside Solutions
454	Yellowstone Soft
455	Oztech Intelligent Systems Pty Ltd.
456	Novelan GmbH
457	Flexim Americas Corporation
458	ICP DAS Co., Ltd.
459	CARMA Industries Inc.
460	Log-One Ltd.
461	TECO Electric & Machinery Co., Ltd.
462	ConnectEx, Inc.
463	Turbo DDC Südwest
464	Quatrosense Environmental Ltd.
465	Fifth Light Technology Ltd.
466	Scientific Solutions, Ltd.
467	Controller Area Network Solutions (M) Sdn Bhd
468	RESOL - Elektronische Regelungen GmbH
469	RPBUS LLC
470	BRS Sistemas Eletronicos
471	WindowMaster A/S
472	Sunlux Technologies Ltd.
473	Measurlogic
474	Frimat GmbH
475	Spirax Sarco
476	Luxtron
477	Raypak Inc
478	Air Monitor Corporation
479	Regler Och Webbteknik Sverige (ROWS)
480	Intelligent Lighting Controls Inc.
481	Sanyo Electric Industry Co., Ltd
482	E-Mon Energy Monitoring Products
483	Digital Control Systems
484	ATI Airtest Technologies, Inc.
485	SCS SA
486	HMS Industrial Networks AB
487	Shenzhen Universal Intellisys Co Ltd
488	EK Intellisys Sdn Bhd
489	SysCom
490	Firecom, Inc.
491	ESA Elektroschaltanlagen Grimma GmbH
492	Kumahira Co Ltd
493	Hotraco

494	SABO Elektronik GmbH
495	EquipTrans
496	TCS Basys Controls
497	FlowCon International A/S
498	ThyssenKrupp Elevator Americas
499	Abatement Technologies
500	Continental Control Systems, LLC
501	WISAG Automatisierungstechnik GmbH & Co KG
502	EasyIO
503	EAP-Electric GmbH
504	Hardmeier
505	Mircom Group of Companies
506	Quest Controls
507	Mestek, Inc
508	Pulse Energy
509	Tachikawa Corporation
510	University of Nebraska-Lincoln
511	Redwood Systems
512	PASStec Industrie-Elektronik GmbH
513	NgEK, Inc.
514	FAW Electronics Ltd
515	Jireh Energy Tech Co., Ltd.
516	Enlighted Inc.
517	El-Piast Sp. Z o.o
518	NetxAutomation Software GmbH
519	Invertek Drives
520	Deutschmann Automation GmbH & Co. KG
521	EMU Electronic AG
522	Phaedrus Limited
523	Sigmatek GmbH & Co KG
524	Marlin Controls
525	Circutor, SA
526	UTC Fire & Security
527	DENT Instruments, Inc.
528	FHP Manufacturing Company - Bosch Group
529	GE Intelligent Platforms
530	Inner Range Pty Ltd
531	GLAS Energy Technology
532	MSR-Electronic-GmbH
533	Energy Control Systems, Inc.
534	EMT Controls
535	Daintree Networks Inc.
536	EURO ICC d.o.o
537	TE Connectivity Energy
538	GEZE GmbH
539	NEC Corporation
540	Ho Cheung International Company Limited

541	Sharp Manufacturing Systems Corporation
542	DOT CONTROLS a.s.
543	BeaconMedæs
544	Midea Commercial Aircon
545	WattMaster Controls
546	Kamstrup A/S
547	CA Computer Automation GmbH
548	Laars Heating Systems Company
549	Hitachi Systems, Ltd.
550	Fushan AKE Electronic Engineering Co., Ltd.
551	Toshiba International Corporation
552	Starman Systems, LLC
553	Samsung Techwin Co., Ltd.
554	ISAS-Integrated Switchgear and Systems P/L
556	Obvius
557	Marek Guzik
558	Vortek Instruments, LLC
559	Universal Lighting Technologies
560	Myers Power Products, Inc.
561	Vector Controls GmbH
562	Crestron Electronics, Inc.
563	A&E Controls Limited
564	Projektomontaza A.D.
565	Freeaire Refrigeration
566	Aqua Cooler Pty Limited
567	Basic Controls
568	GE Measurement and Control Solutions Advanced Sensors
569	EQUAL Networks
570	Millennial Net
571	APLI Ltd
572	Electro Industries/GaugeTech
573	SangMyung University
574	Coppertree Analytics, Inc.
575	CoreNetiX GmbH
576	Acutherm
577	Dr. Riedel Automatisierungstechnik GmbH
578	Shina System Co., Ltd
579	Iqapertus
580	PSE Technology
581	BA Systems
582	BTICINO
583	Monico, Inc.
584	iCue
585	tekmar Control Systems Ltd.
586	Control Technology Corporation
587	GFAE GmbH
588	BeKa Software GmbH

589	Isoil Industria SpA
590	Home Systems Consulting SpA
591	Socomec
592	Everex Communications, Inc.
593	Ceiec Electric Technology
594	Atrila GmbH
595	WingTechs
596	Shenzhen Mek Intellisys Pte Ltd.
597	Nestfield Co., Ltd.
598	Swissphone Telecom AG
599	PNTECH JSC
600	Horner APG, LLC
601	PVI Industries, LLC
602	Ela-compil
603	Pegasus Automation SDN BHD
604	Wight Electronic Services Ltd.
605	Marcom
606	Exhausto A/S
607	Dwyer Instruments, Inc.
608	Link GmbH
609	Oppermann Regelgerate GmbH
610	NuAire, Inc.
611	Nortec Humidity, Inc.
612	Bigwood Systems, Inc.
613	Enbala Power Networks