Building Automation via BACnet

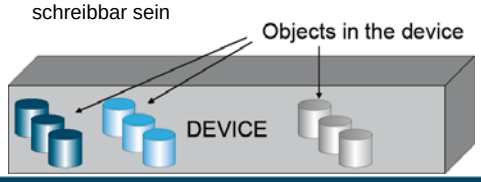
Was (wird kommuniziert)?

- Gesprächsthema, Inhalt einer Postsendung oder E-Mail...
- Standardobjekte, die Eigenschaften physikalischer oder virtueller Größen abbilden

BACnet Objekte

PROPERTIES	CONFORMANCE CODE
Object_Identifier	R
Object_Name	R
Object_Type	R
Present_Value	R
Description	O

- Jedes BACnet Gerät verwaltet Objekte
- Objekte setzen sich aus Eigenschaften („Properties“) zusammen
- Properties können lesbar oder lesbar und schreibbar sein



BACnet Objekte

PROPERTIES	CONFORMANCE CODE
Object_Identifier	R
Object_Name	R
Object_Type	R
Present_Value	R
Description	O

- Bestimmte Properties sind zwingend erforderlich (R=„Required“ und „Readable“=Lesbar)
- Andere Properties können optional unterstützt werden (O=„Optional“)
- Einige Properties müssen lesbar und schreibbar sein (W=„Writable“)
- Dieses nennt sich „Conformance Code“.

Die BACnet Standard Objekte

Data Representation

- Analog Input
- Analog Output
- Analog Value
- Binary Input
- Binary Output
- Binary Value
- Multistate Input
- Multistate Output
- Multistate Value
- Accumulator
- Pulse-Converter
- Averaging
- Device

Control

- Command
- Program
- Loop
- File
- Calendar
- Schedule
- Lighting Output
- Network Security
- Group
- Global Group
- Structured View
- Channel Object
- Trendlog
- Trendlog Multiple
- Load Control

Alarming / Access Control

- Event Enrollment
- Notification-Class
- Event-Log
- Life Safety Point
- Life Safety Zone
- Alert Enrollment
- Notification Follower
- Access Door
- Access Point
- Access Zone
- Access User
- Access Rights
- Access Credential
- Credential Data Input

Primitive Values

- CharacterString
- Large Analog
- BitString
- OctetString
- Integer
- Positive Integer
- Time
- Date
- DateTime
- DateTime Pattern
- Time Pattern
- Date Pattern

Der Aufbau von BACnet Objekten am Beispiel Analog-Output-Objekt

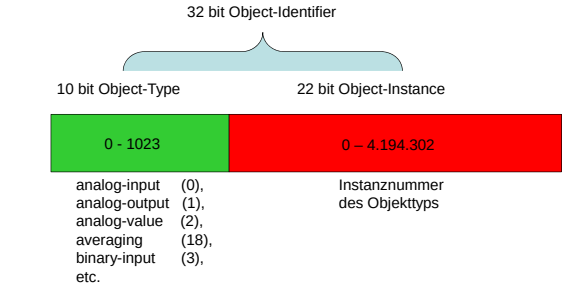
Property Identifier	Property Datatype	Conformance Code
Object_Identifier	BACnetObjectIdentifier	R
Object_Name	CharacterString	R
Object_Type	BACnetObjectType	R
Present_Value	REAL	W
Description	CharacterString	O
Device_Type	CharacterString	O
Status_Flags	BACnetStatusFlags	R
Event_State	BACnetEventState	R
Reliability	BACnetReliability	O
Out_Of_Service	BOOLEAN	R
Units	BACnetEngineeringUnits	R
Min_Pres_Value	REAL	O
Max_Pres_Value	REAL	O
Resolution	REAL	O
Priority_Array	BACnetPriorityArray	R
Relinquish_Default	REAL	R
COV_Increment	REAL	O[1]
Time_Delay	Unsigned	O[2]
Notification_Class	Unsigned	O[2]
High_Limit	REAL	O[2]
Low_Limit	REAL	O[2]
Deadband	REAL	O[2]
Limit_Enable	BACnetLimitEnable	O[2]
Event_Enable	BACnetEventTransitionBits	O[2]
Acked_Transitions	BACnetEventTransitionBits	O[2]
Notify_Type	BACnetNotifyType	O[2]
Event_Time_Stamps	BACnetARRAY[3] of BACnetTimeStamp	O[2]
Profile_Name	CharacterString	O

Beispiel: Analog Output

Object_Identifier	10 Bit Type, 22 Bit Instance number
Object_Name	Unique name
Object_Type	10 Bit Type (list)

Der Objekttyp ist eine festgelegte Aufzählung
BACnetObjectType ::= ENUMERATED {

analog-input	(0),
analog-output	(1),
analog-value	(2),
averaging	(18),
binary-input	(3),
binary-output	(4),
binary-value	(5),…
device	**(8)**, etc.…



Adressierung mit der Instanznummer

Mit dieser Adressierung kann ein einzelnes Gerät also max. 2^{10} x 2^{22} Objekte unterstützen!

Ein BACnet-Netzwerk kann aus max. 2^{22} Geräten bestehen!

2^{10} = 1.024 (0 – 1.023)
2^{22} = 4.194.304 (0 - 4.194.302)

4.194.303 ist als Platzhalter reserviert

Eindeutige Indentifier

Jedes Gerät muss innerhalb des Netzwerkes eindeutig adressiert werden.

Jedes Objekt innerhalb eines Geräte muss eindeutig sein.

Beispiel: Analog Output Objekt

Present_Value	Present value
Description	Description
DeviceType	Device classification
Status_Flags	Object status
Event_State	Alarm/event status
Reliability	Availability of present values
Out_Of_Service	Physical decoupling
Units	Physical units
Min_Pres_Value	Minumum present value
Max_Pres_Value	Maximum present value
Resolution	Resolution

Beispiel: Analog Output Objekt

Priority_Array	Storage for Priorized values
Relinquish_Default	Default Value

Beispiel: Analog Output Objekt

COV_Increment	Threshold for notification of change of value

Example: Analog Output Object

Time_Delay	Delay for notification
Notification_Class	Alarm object
High_Limit	High alarm limit
Low_Limit	Low alarm limit
Deadband	Deadband upon return to normal range
Limit_Enable	Specifies active limits
Event_Enable	Specifies which transitions are notified

Example: Analog Output Object

Acked_Transitions	Storage for acknowledged transitions
Notify_Type	Notifies whether an event or alarm has to be generated
EventTimeStamps	Time-stamp of the transitions

Example: Analog Output Object

Profile_Name	Name of a (non-BACnet) object profile

Used for mapping of other protocols/data objects in BACnet, e.g. EIB/KNX or LonMark Objects (in progress) to BACnet

Datentypen

- **Properties der Objekte werden durch Grunddatentypen, wie z.B. FLOAT, unsigned16 oder Character String dargestellt.**
- NULL **[APPLICATION 0], equivalent to [UNIVERSAL 5]**
- BOOLEAN **[APPLICATION 1], equivalent to [UNIVERSAL 1]**
- Unsigned8 **::= Unsigned (0..255)**
- Unsigned16 **::= Unsigned (0..65535)**
- REAL **[APPLICATION 4], equivalent to [UNIVERSAL 9] ANSI/IEEE-754 single precision floating point**
- **etc. ...**

Datentypen (Zeit)

- Properties der Objekte können auch aus zusammengesetzten Strukturen bestehen.

Time ::= [APPLICATION 11] OCTET STRING (SIZE(4))

- first octet hour (0..23), (X'FF') = unspecified
- second octet minute (0..59), (X'FF') = unspecified
- third octet second (0..59), (X'FF') = unspecified
- fourth octet hundredths (0..99), (X'FF') = unspecified

Date ::= [APPLICATION 10] OCTET STRING (SIZE(4))

first octet year minus 1900	**X'FF' = unspecified**
second octet month (1.. 14)	**1 = January** **13 = odd months** **14 = even months** **X'FF' = unspecified**
third octet day of month (1..34),	**32 = last day of month** **33 = odd days of month** **34 = even days of month** **X'FF' = unspecified**
fourth octet day of week (1..7)	**1 = Monday** **7 = Sunday** **X'FF' = unspecified**

Datatypes

- **Properties der Objekte können auch aus einer Auswahl bestehen.**

  BACnetCalendarEntry ::= CHOICE {
  - **date** **[0] Date,** **-> Einzeldatum**
  - **dateRange** **[1] BACnetDateRange,** **-> Datumsbereich**
  - **weekNDay** **[2] BACnetWeekNDay** **-> Wochen/Tage**

- Die Kodierung erfolgt nach ASN.1 (Abstract Syntax Notation).

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Haben Sie Fragen?