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|  | **imotion** |
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|  | Hardware Manager Documentation |
|  |  |
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|  |  |
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| 0.1 | 2014-06-19 | WES | SW | Reviewed, OK. |
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| 2.0 | 2014-11-07 | WES | SW | Release matching version 1.4.1445 |
|  |  |  |  |  |

# Introduction

## Hardware Manager version

This document covers Hardware Manager version **1.4.1445**.



## Purpose

The goal of this document is to describe in detail each Hardware Manager parameter in order to configure it properly.

At the end of this document, the reader will have all the details to configure Hardware Manager.

## Intended Audience

This document is addressed to product managers or customer project managers that are familiar with this product and are able to install, operate and maintain it.

# System Overview

Hardware Manager is the core component responsible to interact with the hardware and the operating system.

This is a software component that must be part of every system.

## Interaction with hardware

The Hardware Manager is the application which interacts with the hardware of the TFT system. The Hardware Manager controls various external interfaces like I/O’s, Button, Update LED and internal features like serial number of the hardware, backlight control etc.

## Interaction with operating system

Besides interacting with the hardware, this application is also responsible for interactions with the operating system. Hardware Manager controls the system sound volume and provides system time synchronization (through SNTP, VDV 301 or peer-to-peer between Gorba devices). It also records the current CPU temperature.

## Operating system settings

Hardware Manager is also responsible to configure the operating system according to settings provided in HardwareManager.xml. These settings include:

* Hostname (computer name)
* Time zone
* IP address, subnet mask and gateway

The settings can be applied depending on the value of digital inputs in the system. This allows for “coded” cables or connectors to be used to configure for example different IP address settings in a vehicle with multiple devices (e.g. trams with multiple InfoVision Compacts or Quadros).

## Providing inputs and outputs to other applications

The Hardware Manager also helps other applications interact with the hardware and the operating system via GIOoM and Medi.

## VDV 301 handling

The VDV 301 (IBIS over IP) protocol requires every device to have a DeviceManagementService. If enabled in the configuration, Hardware Manager implements that service providing the necessary data to other VDV 301 devices and applications.

For automatic service discovery, VDV 301 requires also every device to contain a DNS-SD server. Hardware Manager implements its own DNS-SD server, but also supports using Apple’s Bonjour service if available.

For these reasons, VDV 301 must always be configured and enabled in Protran as well as in Hardware Manager. Failing to enable it in HardwareManager.xml will prevent Protran from discovering the VDV 301 CustomerInformationService.

# HardwareManager.xml

The Hardware Manager requires configuration in order to operate correctly with the selected hardware. The file for configuration is **“HardwareManager.xml”**. Hardware Manager also requires “**NLog.config**” for logging and **“medi.config”** for the Medi configuration.

## @XmlDoc(xsd=..\..\..\Common\Configuration\Source\HardwareManager\HardwareManager.xsd;xml=..\Source\Core\HardwareManager.xml)

# HardwareManager example usages

## GPIO example usages

The IO pins of the hardware can be configured as input or output. The indexed of the pins to be used as inputs or outputs are determined by the hardware being used.

### IO pin as input for StopRequest example usage

This is an example to configure and use an IO pin for Stop Request.

Firstly, based on the hardware, select the correct index of the pin to be used for Stop Request. Here, the example is based on using an InfoVision TFT 18.5” Compact hardware with the pin with Index = 0 for the Stop Request.

This is the configuration to be set in HardwareManager.xml

<GPIO>

  <Pin Index="0">StopRequest</Pin>

  <Pin Index="1">Pin1</Pin>

  <Pin Index="2">Pin2</Pin>

  <Pin Index="3">Pin3</Pin>

  <Pin Index="4">Pin4</Pin>

  <Pin Index="5">Pin5</Pin>

  <Pin Index="6">Pin6</Pin>

  <Pin Index="7">Pin7</Pin>

</GPIO>

In case Protran application is used, to create the Ximple, we need to specify the usage according to dictionary.xml. An example of io.xml for Protran is as seen below. **The name of the pin under GPIO must match the “Name” attribute configuration for <Input>**.

<IO>

  <SerialPorts>

    <SerialPort/>

  </SerialPorts>

  <Inputs>

    <Input Name="StopRequest" TransfRef="Default" Enabled="true">

      <UsedFor Table="SystemStatus" Column="StopRequestedState" Row="0"/>

    </Input>

  </Inputs>

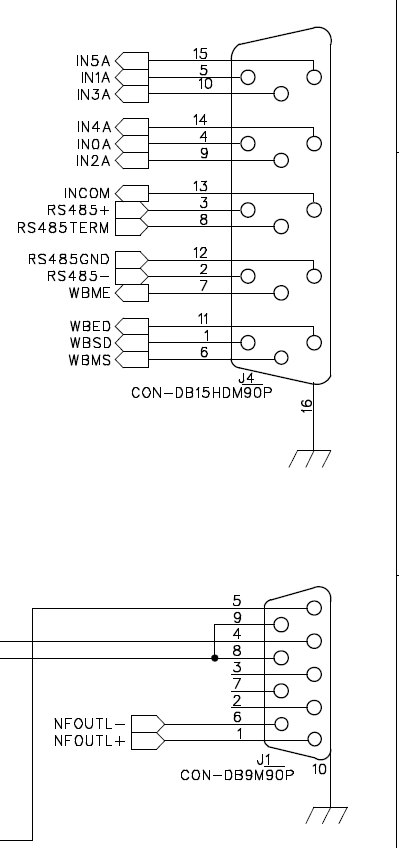
  <Transformations>

    <Chain id="Default" />

  </Transformations>

</IO>

The hardware pin connector for InfoVision Compact is as seen below



The cable for InfoVision Compact has to be checked for the correct pin to be used for the StopRequest. If the pin Index = 0 is configured to be used, then Pin4 on the cable 07.00.03.36.186 must be connected as seen above in the cable diagram.

### IO pin as output for Audio speaker example usage

#### Example usage for one Audio Speaker

This is an example to configure and use an IO pin for Speaker output.

Firstly, based on the hardware, select the correct index of the pin to be used for Speaker output. Here, the example is based on using an InfoVision Compact hardware with the pin with Index = 6 for the Speaker output.

This is the configuration to be set for the Speaker output in HardwareManager.xml

<GPIO>

  <Pin Index="0">Pin0</Pin>

  <Pin Index="1">Pin1</Pin>

  <Pin Index="2">Pin2</Pin>

  <Pin Index="3">Pin3</Pin>

  <Pin Index="4">Pin4</Pin>

  <Pin Index="5">Pin5</Pin>

  <Pin Index="6">Speaker</Pin>

  <Pin Index="7">Pin7</Pin>

</GPIO>

If AudioRenderer is used, then the AudioRenderer.xml must be configured to have the IO pin for the Speaker to be able to switch the Speaker on and off based on when the audio is available. **The name of the pin under GPIO must match the “Name” attribute configuration for <SpeakerPort>**.

This is the configuration to be set for the Speaker output in AudioRenderer.xml

  <IO>

    <VolumePort Name="SystemVolume" />

  </IO>

  <AudioChannels>

    <AudioChannel Id="1">

      <SpeakerPort Name="Speaker" />

    </AudioChannel>

 </AudioChannels>

#### Example usage for two Audio Speakers

Firstly, based on the hardware, select the correct indexs of the pins to be used for the two Speaker outputs. Here, the example is based on using an InfoVision Compact hardware with the pin with Index = 6 for one Speaker output and Index = 7 for the second Speaker output.

This is the configuration to be set for the Speaker output in HardwareManager.xml

<GPIO>

  <Pin Index="0">Pin0</Pin>

  <Pin Index="1">Pin1</Pin>

  <Pin Index="2">Pin2</Pin>

  <Pin Index="3">Pin3</Pin>

  <Pin Index="4">Pin4</Pin>

  <Pin Index="5">Pin5</Pin>

  <Pin Index="6">SpeakerOne</Pin>

  <Pin Index="7">SpeakerTwo</Pin>

</GPIO>

If AudioRenderer is used, then the AudioRenderer.xml must be configured to have the IO pin for the Speaker to be able to switch the Speaker on and off based on when the audio is available. **The name of the pin under GPIO must match the “Name” attribute configuration for <SpeakerPort>**.

This is the configuration to be set for the Speaker outputs in AudioRenderer.xml

  <IO>

    <VolumePort Name="SystemVolume" />

  </IO>

  <AudioChannels>

    <AudioChannel Id="1">

      <SpeakerPort Name="SpeakerOne" />

    </AudioChannel>

    <AudioChannel Id="2">

      <SpeakerPort Name="SpeakerTwo" />

    </AudioChannel>

    <AudioChannel Id="3">

      <SpeakerPort Name="SpeakerOne" />

<SpeakerPort Name="SpeakerTwo" />

    </AudioChannel>

 </AudioChannels>

The Id for an Audio Channel must match the Id of the “Physical Screen”for Audio in the \*.im2 file. Hence, the audio to be played for a Physical Screen is played on the **<SpeakerPort>** configured under the Audio Channel with the same Id. If more than one **<SpeakerPort>** is configured on an Audio Channel, all of them are switched on at the same time and the audio is played them.

### IO pins to configure the <Conditions> usage

The IO pins can be used to specific certain conditions that must be satisfied in order to apply configured settings in HardwareManager.xml. The name of the pin under GPIO must match the name of the IO configuration under <Conditions>.

<Mgi Enabled="true">

<GPIO>

<Pin Index="0">Address0</Pin>

<Pin Index="1">Address1</Pin>

<Pin Index="2">Address2</Pin>

<Pin Index="3">Address3</Pin>

<Pin Index="4">LastUnit</Pin>

<Pin Index="5">Pin5</Pin>

<Pin Index="6">Pin6</Pin>

<Pin Index="7">Pin7</Pin>

</GPIO>

</Mgi>

<Settings>

<Setting>

<Conditions>

<IO Name="Address0" Value="1"/>

<IO Name="Address1" Value="0"/>

<IO Name="Address2" Value="0"/>

<IO Name="Address3" Value="0"/>

<IO Name="LastUnit" Value="0"/>

</Conditions>

<HostnameSource>MacAddress</HostnameSource>

<TimeZone>UTC</TimeZone>

<IPAddress>192.168.10.41</IPAddress>

<SubnetMask>255.255.255.0</SubnetMask>

<Gateway>192.168.10.254</Gateway>

</Setting>

</Settings>

## RS485Interface usages

The RS485 Interface can be configured to have two options. The configuration is important for InfoVision Compact hardware. The two options available are

* To use the USB port for RS485 communication if configured via AtmelControl

<RS485Interface>Cpu</RS485Interface>

* To use the USB port for display control by AT91 controller

<RS485Interface>At91</RS485Interface>

## DVI Level Shifters example usages

### DVI Level Shifter usage on InfoVision Compact and Topbox Mini

The index of the DVI level shifter on the InfoVision Compact and Topbox Mini hardware must be 2.

The trim option can be set to enable the output current with default value (0V = StandardCurrent) or increasing it by 10% (3.3V = IncreasedCurrent).

The output level is the pre-emphasis level that can be set for the DVI level shifter.

    <DviLevelShifters>

      <DviLevelShifter Index="2">

        <Trim>IncreasedCurrent</Trim>

        <OutputLevel>2</OutputLevel>

      </DviLevelShifter>

    </DviLevelShifters>

### DVI Level Shifter usage on InfoVision PC-2

There are two DVI level shifters on the InfoVision PC-2 hardware with indexes 1 and 2.

    <DviLevelShifters>

      <DviLevelShifter Index="1">

        <Trim>StandardCurrent</Trim>

        <OutputLevel>0</OutputLevel>

      </DviLevelShifter>

      <DviLevelShifter Index="2">

        <Trim>StandardCurrent</Trim>

        <OutputLevel>0</OutputLevel>

      </DviLevelShifter>

    </DviLevelShifters>

## SNTP example usage

The time synchronization of the system can be done by enabling the SNTP time synchronization configuration. This performs time synchronization of the system with the network time. **When this configuration is enabled, time synchronization via IBIS (on Protran) or VDV301 (on HardwareManager) must be disabled.**

<SNTP Enabled="true" Host="5.39.184.5" Port="123" Version="4" />

<VDV301 Enabled="true" DeviceClass="InteriorDisplay">

  <TimeSync Enabled="false" Version="3" />

</VDV301>

or

<SNTP Enabled="true" Host="5.39.184.5" Port="123" Version="4" />

<VDV301 Enabled="false" DeviceClass="InteriorDisplay">

  <TimeSync Enabled="false" Version="3" />

</VDV301>

## VDV301 example usage

### Time snychronization exaple usage

The time synchronization of the system can be done using the VDV301 protocol. **When time synchronization is configured to be performed by VDV301 protocol, it must be disabled in SNTP (on HardwareManager) and IBIS (on Protran).**

  <VDV301 Enabled="true" DeviceClass="InteriorDisplay">

    <TimeSync Enabled="true" Version="3" />

  </VDV301>

## Settings example usage

The Hardware settings than can be set can be dependent on certain conditions specified with <Conditions> or configured to be applied without any conditions. If there are no conditions specified and different options for settings are available for hardware, then the first option specified under <Settings> is applied if it is different from the current hardware settings.

  <Settings>

    <Setting>

      <Conditions/>

      <HostnameSource>MacAddress</HostnameSource>

      <TimeZone>UTC</TimeZone>

      <IPAddress>192.168.1.210</IPAddress>

      <SubnetMask>255.255.255.0</SubnetMask>

      <Gateway>192.168.1.254</Gateway>

    </Setting>

    <Setting>

      <Conditions/>

      <HostnameSource>SerialNumber</HostnameSource>

      <TimeZone>UTC</TimeZone>

      <IPAddress>192.168.1.210</IPAddress>

      <SubnetMask>255.255.255.0</SubnetMask>

      <Gateway>192.168.1.254</Gateway>

    </Setting>

  </Settings>

In the above example, always the first <Setting> is applied on the hardware.

## Timezone example usage

The Time zone can be set on the hardware by configuring it under <Settings>. The time zone must be specified as a string which must be one of the options available in the Windows registry under

HKEY\_LOCAL\_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Time Zones\

The UTC offsets of time zones are also available at:

<http://en.wikipedia.org/wiki/Time_zone>

<TimeZone>Arabic Standard Time</TimeZone>

<TimeZone>Israel Standard Time</TimeZone>

# Glossary

|  |  |
| --- | --- |
| DNS-SD | Domain Name System-Service Discovery; Protocol to discover services in an unknown network, also known as “Bonjour” by Apple Inc. |
| GIOoM | Gorba I/O over Medi; Protocol used to read and write digital inputs and outputs over the Medi protocol |
| GPIO | General-purpose input/output; digital input or output available on certain hardware |
| I/O | Input or output |
| Medi | Message Dispatcher protocol used to communicate between Gorba software components |
| RTS | Request To Send; output line on a serial port |
| SNTP | Simple Network Time Protocol: widely used protocol to synchronize time of computers connected to a network |
| Ximple | Gorba Protocol used over Medi for communication between Protran and Composer |