

## Hypervisor on Module

<b>Affected Products</b>	All congatec products that support the RTS Hypervisor
<b>Confidential/Public</b>	Public
<b>Author</b>	GCL

## Revision History

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Revision	Date (yyyy-mm-dd)	Author	Changes
1.0	2024-04-29	GCL	Initial release

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## Preface

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This Application Note gives a general overview of how to install, configure, use and troubleshoot the RTS Hypervisor on congatec x86-based modules.

For more information about the RTS Hypervisor, refer to the RTS Hypervisor Manual “RTS-Hypervisor.pdf”.

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## Symbols

The following are symbols used in this application note.



*Notes call attention to important information that should be observed.*



*Cautions warn the user about how to prevent damage to hardware or loss of data.*



*Warnings indicate that personal injury can occur if the information is not observed.*

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## Terminology

Term	Description
ESP	EFI System Partition
GPOS	General-Purpose Operating System
OS	Operating System
RTS	Real Time Systems
RTOS	Real-Time Operating System

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## 1 Introduction

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As part of the [aReady.COM](https://www.congatec.com/aReady.COM) strategy, the RTS Hypervisor is now integrated into the congatec firmware by default on congatec x86-based modules. The integrated RTS Hypervisor offers a 30-day free evaluation license. The 30-day evaluation starts when the customer receives the x86-based modules.

The Real-Time Operating System images, driver packages for the General-Purpose Operating System and the installation procedures for the Operating Systems are available for download in the restricted area of congatec website at [www.congatec.com/login](https://www.congatec.com/login).

The packages available for download are listed in the table below.

Package Name	Description
RTH-Release_R5.7.03.31618_INtime_runtime.zip	Prepared Evaluation Package for INtime DRTOS
RTH-Release_R5.7.03.31618_Linux-rt_runtime.zip	Prepared Evaluation Package for Debian with preempt-rt
RTH-Release_R5.7.03.31618_Linux-xenomai_runtime.zip	Prepared Evaluation Package for Debian with Xenomai
RTH-Release_R5.7.03.31618_QNX_runtime.zip	Prepared Evaluation Package for BlackBerry QNX. Only provided with GPOS Windows
RTH-Release_R5.7.03.31618_VxWorks_runtime.zip	Prepared Evaluation Package for WindRiver VxWorks

## 2 Installing the Packages

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This section describes how to install and configure the packages for the integrated RTS Hypervisor.

### Installation Requirements

Before you install the packages for the integrated RTS Hypervisor:

1. Make sure a General-Purpose Operating System (GPOS) is pre-installed. The General-Purpose Operating System must be installed on a mass storage connected to an AHCI controller or an NVMe controller.
2. The RTS Hypervisor supports different types and versions of GPOS. For the list of GPOS types and versions supported by the RTS Hypervisor, see <https://www.real-time-systems.com/products/os-compatibility/>.
3. Assign at least 128 GB storage to the System Drive (C:) if you use Microsoft Windows OS as General-Purpose Operating System. The System Drive must have at least 4GB of free disk space.
4. If you use a Linux OS as General-Purpose Operating System, the ESP partition must have at least 300 MB of free disk space. The root file system must have at least 1 GB of free disk space.

### 2.1 Download Installation Package

1. Log in to the congatec customer portal at [www.congatec.com/login](http://www.congatec.com/login)
2. In the “Technical information” list, click “Virtualization Ready RTOS Packages”. The package page opens.
3. Download the appropriate packages for your GPOS.

### 2.2 Install the Downloaded Package

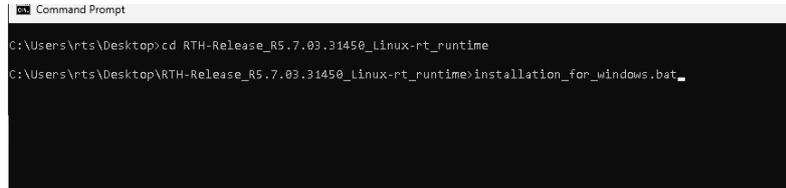
The downloaded package contains installation scripts for both Windows and Linux General-Purpose Operating Systems.

Run the `installation_for_windows.bat` script for systems pre-installed with Windows Operating System. The installation steps are described in section 2.2.1 “Windows Operating System”. For systems pre-installed with Linux Operating System, run the `installation_for_linux.sh` script. The installation steps are described in section 2.2.2 “Linux Operating System”.

#### 2.2.1 Windows Operating System

1. Unzip the downloaded package for your intended Real Time Operating System to a location on your system for the RTS Hypervisor. For example, `C:\Users\rts\Desktop`.
2. Open the command prompt.

3. Navigate to the directory of the extracted package. For example:  
`cd RTH-Release_R5.7.03.31450_Linux-rt_runtime`
4. Type `installation_for_windows.bat` and press **Enter**.



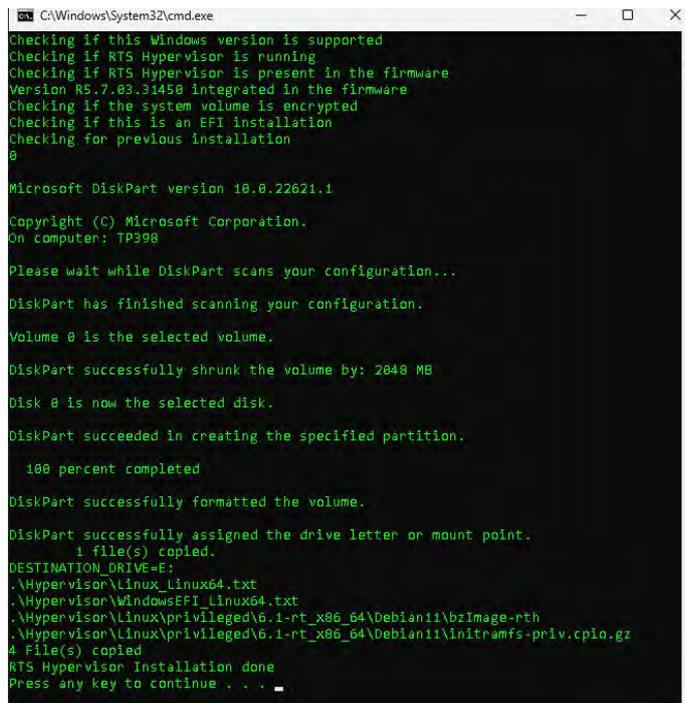
```
Command Prompt
C:\Users\rts\Desktop>cd RTH-Release_R5.7.03.31450_Linux-rt_runtime
C:\Users\rts\Desktop\RTH-Release_R5.7.03.31450_Linux-rt_runtime>installation_for_windows.bat
```

The User Account Control prompt appears.

5. Click **Yes** to confirm.



The installation process begins. The output of the command line is shown below:



```
C:\Windows\System32\cmd.exe
Checking if this Windows version is supported
Checking if RTS Hypervisor is running
Checking if RTS Hypervisor is present in the firmware
Version R5.7.03.31450 integrated in the firmware
Checking if the system volume is encrypted
Checking if this is an EFI installation
Checking for previous installation
0

Microsoft DiskPart version 18.0.22621.1

Copyright (C) Microsoft Corporation.
On computer: TP398

Please wait while DiskPart scans your configuration...

DiskPart has finished scanning your configuration.

Volume 0 is the selected volume.

DiskPart successfully shrunk the volume by: 2048 MB

Disk 0 is now the selected disk.

DiskPart succeeded in creating the specified partition.

    100 percent completed

DiskPart successfully formatted the volume.

DiskPart successfully assigned the drive letter or mount point.
    1 file(s) copied.
DESTINATION_DRIVE=E:
.\Hypervisor\Linux_Linux64.txt
.\Hypervisor\WindowsEFI_Linux64.txt
.\Hypervisor\Linux\privileged\6.1-rt_x86_64\Debian11\bzImage-rt
.\Hypervisor\Linux\privileged\6.1-rt_x86_64\Debian11\initramfs-priv.cpio.gz
4 File(s) copied
RTS Hypervisor Installation done
Press any key to continue . . .
```

The installation is complete when the command line output shows “RTS Hypervisor Installation done”.

## 2.2.2 Linux Operating System

1. Open the command line interface.
2. Unzip the downloaded package for your intended Real Time Operating System to a location on your system for the RTS Hypervisor. For example, /home/rts/Downloads.

```
# cd /home/rts/Downloads
# unzip RTH-Release_R5.7.03.31450_VxWorks_runtime.zip
```



```
root@debian12: /home/rts/Downloads# unzip RTH-Release_R5.7.03.31450_VxWorks_runtime.zip
```

3. Navigate to the directory of the extracted package. For example:
4. Type `bash installation_for_linux.sh` to run the installation script (requires root privilege)

```
# cd RTH-Release_R5.7.03.31450_VxWorks_runtime/
```

```
# bash installation_for_linux.sh
```



```
inflating: RTH-Release_R5.7.03.31450_VxWorks_runtime/installation_for_linux.sh
inflating: RTH-Release_R5.7.03.31450_VxWorks_runtime/installation_for_windows.bat
inflating: RTH-Release_R5.7.03.31450_VxWorks_runtime/readme.txt
root@debian12: /home/rts/Downloads# cd RTH-Release_R5.7.03.31450_VxWorks_runtime/
root@debian12: /home/rts/Downloads/RTH-Release_R5.7.03.31450_VxWorks_runtime#
root@debian12: /home/rts/Downloads/RTH-Release_R5.7.03.31450_VxWorks_runtime#
root@debian12: /home/rts/Downloads/RTH-Release_R5.7.03.31450_VxWorks_runtime# bash installation_for_linux.sh
Using current directory as a source: /home/rts/Downloads/RTH-Release_R5.7.03.31450_VxWorks_runtime
```

The installation process begins. The output of the command line interface is shown below:



```
.service.
Created symlink /etc/systemd/system/shutdown.target.wants/rthSetState.service - /lib/systemd/system/rthSetState.service.
Processing triggers for man-db (2.11.2-2) ...

*****
  Script finished successfully
*****
root@debian12: /home/rts/Downloads/RTH-Release_R5.7.03.31450_VxWorks_runtime#
```

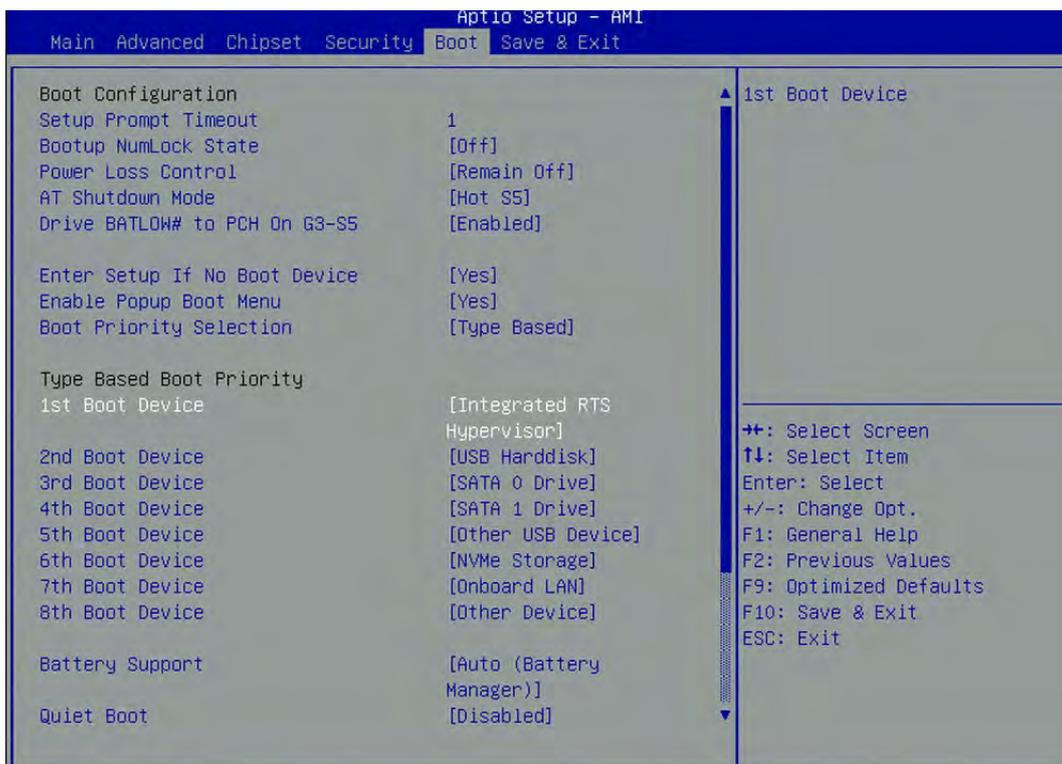
The installation is complete when the command line output shows “Script finished successfully”.

## 3 Select Boot Priority

To activate the RTS Hypervisor, you need to change the “1st Boot Device” in the BIOS setup menu to “Integrated RTS Hypervisor”.

1. Press F2 or DEL during POST to enter the BIOS setup menu.
2. Go to the Boot tab to enter the Boot setup screen.
3. Select “Integrated RTS Hypervisor” as “1st Boot Device”.
4. Go to the Save & Exit tab and select “Save Changes and Exit”.

The system restarts.



### Note

***The configuration steps and the BIOS setup menu above are valid for “Type Based Boot Priority”.***

***For “UEFI Boot Priority”, the BIOS setup menu may differ.***

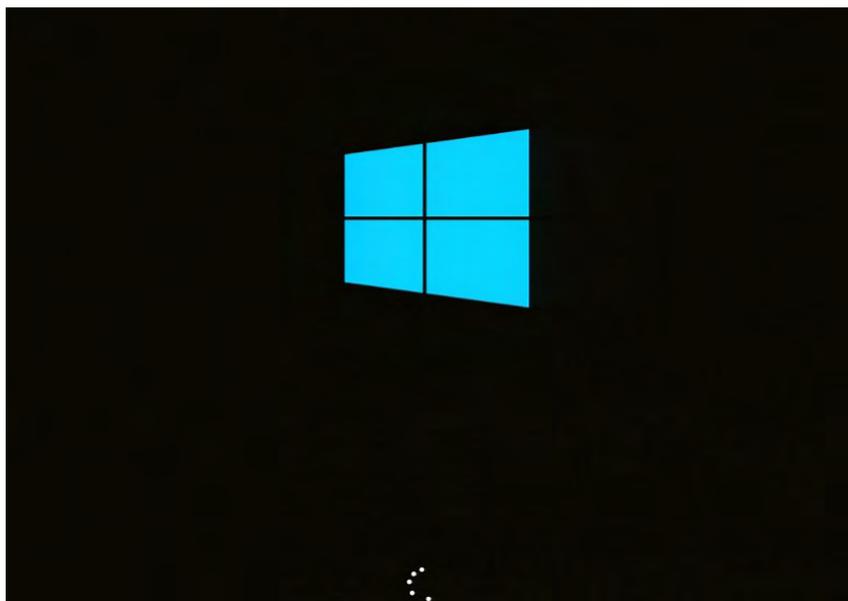
## 3.1 Boot Messages and First Steps

Sample screen shot of the RTS-Hypervisor boot messages.

```
Real-Time Hypervisor
Copyright 2006 - 2024 Real-Time Systems GmbH
Version RS.7.03.3161B

Init CPU
Init heap
Init registry
Read configuration
Init memory
Check license
  company: Congatec
  project: Hypervisor-on-Module
Init system
Init shared memory
Init devices
Init IOMMU
ACPI Device Assignment
Init time synchronization
Found OS "Windows"
Found OS "UxWorks"
Init Registry
Setup Operating Systems
Loading "Windows"
Loading "UxWorks"
Starting Operating Systems
/OS/1 booting runtime 0
```

When the system starts or restarts, the General-Purpose Operating System controls the screen while the Real-Time Operating System runs silently in the background.



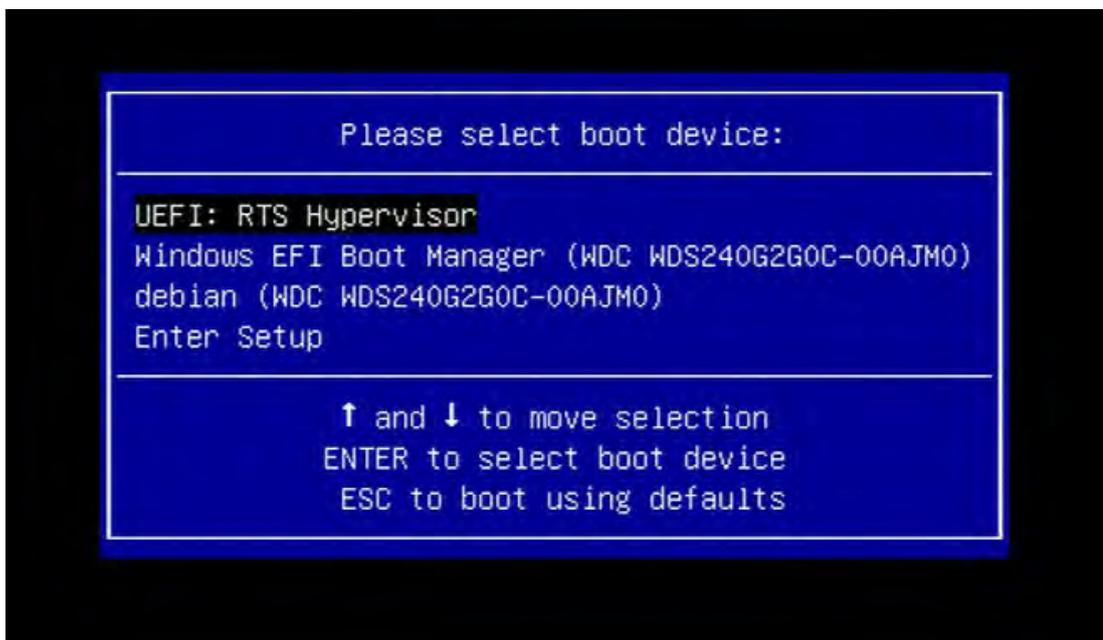
The pre-built congatec demo images for Linux, VxWorks and QNX real-time systems contain a telnet server. Connection to the telnet server is possible with the default IP address (192.168.2.2) of the virtual network in the Real-Time Operating System. For information about user credentials, see the RTS-Hypervisor.pdf manual included in the download package.

The INtime D-RTOS demo image does not contain a telnet server. It uses a webserver. To access the webserver, open a web browser on your General-Purpose Operating System and go to <http://192.168.2.2>. For more details, see the RTS-Hypervisor.pdf manual included in the download package.

## 3.2 Override the Default Boot Selection Manually

You can override the hypervisor as the default boot selection if the RTS Hypervisor has configuration issues. To override the hypervisor:

1. Turn on the system.
2. Press F11 to enter the Boot menu.
3. Select the General-Purpose Operating System from the Boot Menu. For example, the Windows EFI Boot Manager in the image below.



## 4 Configuration Files and Folders

---

This section provides the location of files and folders required for further customization or configuration.

### Important Configuration Files

The following files are important for configuration:

- Bootloader configuration file RthLdr.config.

The RthLdr.config file is a json text file format that points to RTOS image(s), RTS Hypervisor configuration file and the EFI boot file of the General-Purpose Operating System. The RthLdr.config file is located in \EFI\rts folder. You may modify this file if you want to rename or rebase the RTS Hypervisor configuration file or the RTOS image(s).

- Sample configuration files for the RTS Hypervisor:

The download package contains sample configuration files. The configuration file names may change depending on the downloaded package and the pre-installed General-Purpose Operating System.

The format for the sample configuration file name is: (Pre-installed General-Purpose OS)\_(Real-Time OS in download package).txt. For example: Linux\_VxWorks64.txt, WindowsEFI\_Linux.txt, Linux\_INtime.txt or WindowsEFI\_QNX.64.txt.

The sample configuration file is located in the \rth folder. You may modify this file to change the default CPU assignment, assign additional RAM to the RTOS or assign PCI(e), Mass Storage or USB devices according to your use case.

- System files for the Real-Time Operating System:

The image files which contain the Real-Time Operating Systems are located in the \rth\<RTOS>\ folder. The filesystems created from these images are non-persistent because they are created in the RAM. Changes to these file systems will be lost when the RTOS is restarted.



***The folder structure above is for a Windows General-Purpose Operating System. During installation, a new FAT partition labelled "RTHDATA" is created. This partition contains the described files/folders.***

***For Linux General-Purpose Operating System, the setup destination is the EFI System Partition which is mounted to /boot/EFI***

## 5 Configuring the Bootloader

---

The integrated RTS Hypervisor firmware uses a new congatec bootloader. The bootloader requires a configuration file. The file is for configuring the bootloader, but it also offers extended options for advanced RTS Hypervisor integrators and for variant-specific custom configurations with congatec support team.

### 5.1 Configuring the Partition

The congatec bootloader can access FAT partitions and its configuration file is in JSON file format. If you have a syntax problem during configuration, use an online JSON tool (for example, <https://jsonlint.com/>) to verify the JSON file format.

#### 5.1.1 ESP Partition

For Linux GPOS, the bootloader configuration and all other files loaded by the boot loader are installed to the ESP partition. The ESP partition is of partition type FAT. The sample shows the RthLdr.config for a Linux GPOS installation. In Linux GPOS installations, the ESP partition is typically mounted to the mount point /boot/efi.

Sample configuration:

```
{
  "version" : "3.0.0",
  "target" : {
    "type" : "variable"
  },
  "modules" : [
    {
      "name" : "license",
      "type" : "variable"
    },
    {
      "name" : "grubx64.efi",
      "file" : "EFI\\DISTRI\\grubx64.efi"
    },
    {
      "name" : "config",
      "file" : "rth\\Linux_Linux64.txt"
    },
    {
      "name" : "bzImage-rth",
      "file" : "rth\\Linux\\privileged\\6.1-rt_x86_64\\Debian11\\bzImage-rth"
    },
    {
      "name" : "initramfs-priv.cpio.gz",
      "file" : "rth\\Linux\\privileged\\6.1-rt_x86_64\\Debian11\\initramfs-priv.cpio.gz"
    }
  ]
}
```

## 5.1.2 ESP + FAT Partition

The bootloader supports access of up to two FAT partitions for loading components. The first partition is identified by the location of the configuration file `EFI\rts\RthLdr.config`. The second partition can be the ESP (EFI System Partition).

The Windows boot loader is located in the ESP. To make the bootloader refer to the ESP, the corresponding module entry must contain an additional parameter "type" which must be set to "efi" (see sample configuration).

Sample configuration:

```
{
  "version" : "3.0.0",
  "target" : {
    "type" : "variable"
  },
  "modules" : [
    {
      "name" : "license",
      "type" : "variable"
    },
    {
      "name" : "bootmgfw.efi",
      "file" : "EFI\\Microsoft\\Boot\\bootmgfw.efi",
      "type" : "efi"
    },
    {
      "name" : "config",
      "file" : "rth\\WindowsEFI_Linux64.txt"
    },
    {
      "name" : "bzImage-rth",
      "file" : "rth\\Linux\\privileged\\5.15-xenomai_x86_64\\Debian11\\bzImage-rth"
    },
    {
      "name" : "initramfs-priv.cpio.gz",
      "file" : "rth\\Linux\\privileged\\5.15-xenomai_x86_64\\Debian11\\initramfs-priv.cpio.gz"
    }
  ]
}
```

## 5.2 Overriding a License File

To update the information in the license file, you need to load a new module from the RthLdr.config (create a new license.txt file).

Follow the steps below to override the integrated license file:

1. Copy the new license.txt file to the designated location:
  - a. For a Windows GPOS installation, copy the new license.txt file to \EFI\rth folder in the "RTHDATA" partition.
  - b. For a GPOS Linux installation, copy the new license.txt to the \boot\efi\rth\ (or \boot\EFI\rth\ Linux folder.

2. Update the contents of RthLdr.config to load the license.txt file from the filesystem.

The sample configuration below highlights the expected change in Windows GPOS:

```
{
  "version" : "3.0.0",
  "target" : {
    "type" : "variable"
  },
  "modules" : [
    {
      "name" : "license",
      "file" : "EFI\rth\license.txt"
    },
    {
      "name" : "bootmgfw.efi",
      "file" : "EFI\Microsoft\Boot\bootmgfw.efi",
      "type" : "efi"
    },
    {
      "name" : "config",
      "file" : "rth\WindowsEFI_Linux64.txt"
    },
    {
      "name" : "bzImage-rth",
      "file" : "rth\Linux\privileged\5.15-xenomai_x86_64\Debian11\bzImage-rth"
    },
    {
      "name" : "initramfs-priv.cpio.gz",
      "file" : "rth\Linux\privileged\5.15-xenomai_x86_64\Debian11\initramfs-priv.cpio.gz"
    }
  ]
}
```

The sample configuration below highlights the expected change in Linux GPOS:

```
{
  "version" : "3.0.0",
  "target" : {
    "type" : "variable"
  },
  "modules" : [
    {
      "name" : "license",
      "file" : "rth\\license.txt"
    },
    {
      "name" : "grubx64.efi",
      "file" : "EFI\\DISTRI\\grubx64.efi"
    },
    {
      "name" : "config",
      "file" : "rth\\Linux_Linux64.txt"
    },
    {
      "name" : "bzImage-rth",
      "file" : "rth\\Linux\\privileged\\6.1-rt_x86_64\\Debian11\\bzImage-rth"
    },
    {
      "name" : "initramfs-priv.cpio.gz",
      "file" : "rth\\Linux\\privileged\\6.1-rt_x86_64\\Debian11\\initramfs-priv.cpio.gz"
    }
  ]
}
```

3. Save the changes and proceed to override RTS Hypervisor file if required.

## 5.3 Overriding the RTS Hypervisor

To override the RTS- Hypervisor file, follow the steps below:

1. Contact congatec Sales team to get the RTS Hypervisor file in ".elf" format
2. Copy the rthx86.elf file to RTHDATA\\EFI\\rth\\ for Windows GPOS or to \\boot\\efi\\rth\\ (or \\boot\\EFI\\rth\\) for Linux GPOS.
3. Update the contents of RthLdr.config for the target system.

The sample configuration below highlights the expected change in Windows GPOS:

```
{
  "version" : "3.0.0",
  "target" : {
    "type" : "elf",
    "file" : "EFI\\rth\\rthx86.elf"
  },
  "modules" : [
```

```
{
  "name" : "license",
  "file" : "EFI\\rth\\license.txt"
},
{
  "name" : "bootmgfw.efi",
  "file" : "EFI\\Microsoft\\Boot\\bootmgfw.efi",
  "type" : "efi"
},
{
  "name" : "config",
  "file" : "rth\\WindowsEFI_Linux64.txt"
},
{
  "name" : "bzImage-rth",
  "file" : "rth\\Linux\\privileged\\5.15-xenomai_x86_64\\Debian11\\bzImage-rth"
},
{
  "name" : "initramfs-priv.cpio.gz",
  "file" : "rth\\Linux\\privileged\\5.15-xenomai_x86_64\\Debian11\\initramfs-priv.cpio.gz"
}
]
```

The sample configuration below highlights the expected change in Linux GPOS:

```
{
  "version" : "3.0.0",
  "target" : {
    "type" : "elf",
    "file" : "rth\\rthx86.elf"
  },
  "modules" : [
    {
      "name" : "license",
      "file" : "rth\\license.txt"
    },
    {
      "name" : "grubx64.efi",
      "file" : "EFI\\DISTRI\\grubx64.efi"
    },
    {
      "name" : "config",
      "file" : "rth\\Linux_Linux64.txt"
    },
    {
      "name" : "bzImage-rth",
      "file" : "rth\\Linux\\privileged\\6.1-rt_x86_64\\Debian11\\bzImage-rth"
    }
  ]
}
```

```
"name" : "initramfs-priv.cpio.gz",  
"file" : "rth\\Linux\\privileged\\6.1-rt_x86_64\\Debian11\\initramfs-priv.cpio.gz"  
}  
]  
}
```

4. Save the changes and make sure you are using the correct license file.

## 5.4 Bootloader Limitations

The bootloader has the following limitations:

- The modules loaded by the bootloader must be on either a FAT/FAT32 formatted partition which contains RthLdr.config or an EFI system partition (ESP)
- A maximum of 16 modules can be loaded by the bootloader including the compulsory license and config modules.
- All the modules are loaded below the 4 GB memory address.



### Note

***All modules loaded must fit into the available address space provided by the hardware and firmware configuration below 4GB.***

***Therefore, we recommended reserving at least 1 GB of the available space below 4GB for use in the Operating Systems and the RTS Hypervisor.***

## 6 RTS Hypervisor Use Cases

The real-time hypervisor software allows you to consolidate functionality that previously required multiple dedicated systems on a single x86 hardware platform.

### 6.1 Consolidating High-Performance Human Machine Interface and Machine Control

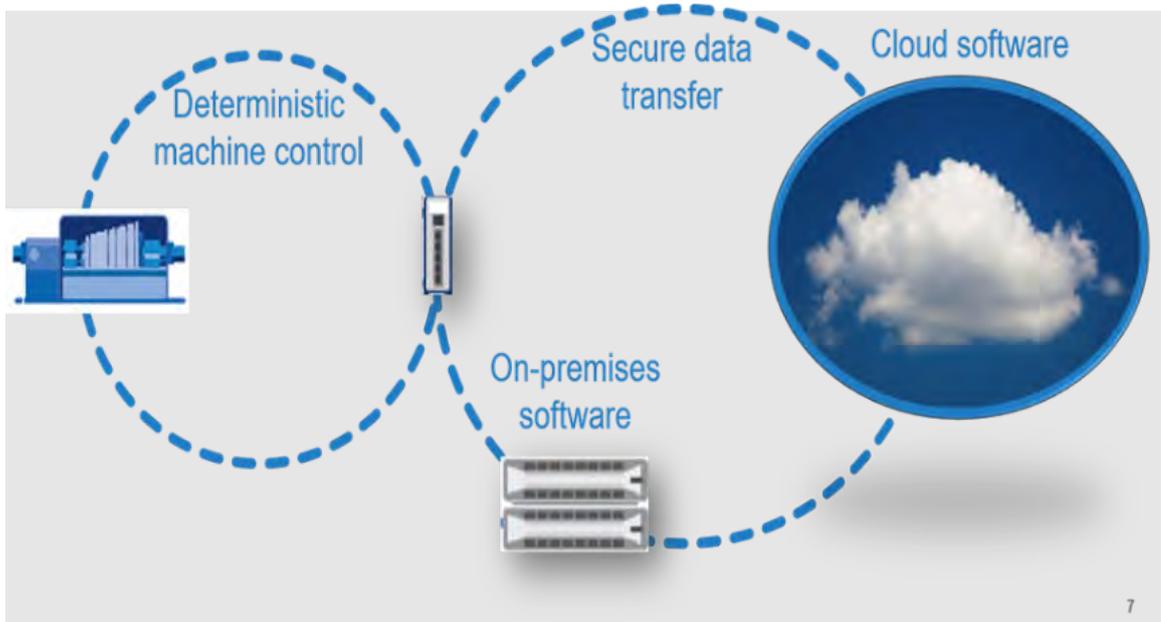
This workload consolidation scenario shows that 3D design software and simulation software can work seamlessly alongside the real-time machine control on a single x86 system.



Features/OS	GPOS	RTOS
High resolution touch display	x	
Software update agent	x	
Motion control		x
Ethernet field bus		x
Backup agent	x	

## 6.2 Consolidating Machine Control and Communication Gateway

This sample use case describes connecting IT and OT operations separately but with the same device. Here, the RTS Hypervisor on the module is the key feature that combines these workload scenarios.



Features/OS	GPOS	RTOS
Cloud connection agent	x	
Software update agent	x	
Verified boot	x	x
Failsafe update	x	x
Ethernet field bus		x
Encrypted file system	x	

## 6.3 Consolidating Mobile Test and Measurement Device

With this computing box, data is captured or injected in real time within vehicle system communication.



Features/OS	GPOS	RTOS
Gather and inject real-time communication		x
Filter and store data series	x	
Upload data measurement series when network is available	x	

## 7 Offered Packages

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For the Hypervisor on Module, congatec offers two types of packages:

- Evaluation Package
- Full Package

The evaluation package has less features compared to the full package. The table below shows the differences.

Features	Evaluation Package Version	Full Package Version
RTOS pre-built evaluation image	Included	Included
Product documentation	Included	Included
libRth usage in applications	Possible	Possible
RTOS application development	Possible	Possible
RTOS components to rebuild image for further integration	Not included	Included
License	Expires (with time limit)	No Expiration (without time limit)

## 8 Uninstalling the Hypervisor

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### 8.1 For Windows as GPOS

1. Open Control Panel ->Programs -> Programs and Features
2. Right-click “Real-Time Hypervisor Drivers and Tools RX.Y.Z.NNNNN” and then click Uninstall.
3. The uninstallation process begins. When the uninstallation completes, all Hypervisor components are removed from Windows OS.
4. Restart the system to boot into Windows EFI Boot Manager (as explained in section 3.2 “Override the Default Boot Selection Manually”)
5. Open Control Panel -> System and Security -> Administrative Tools -> Create and format disk partitions.
6. Right-click the RTHDATA partition and then click Delete Volume.
7. Verify that the partition is no longer visible in File Explorer
8. To remove Integrated RTS Hypervisor entry from the BIOS setup menu, see section 8.3 “Change Default BIOS Entry (Optional)”.

### 8.2 For Linux as GPOS

The installation script used for installing the Hypervisor has an additional option to remove all Hypervisor-related installed files from the system.

1. Boot into Integrated RTS Hypervisor.
2. Navigate to the download package with installation script for Linux -> installation\_for\_linux.sh
3. Execute the command:  

```
sudo installation_for_linux.sh --uninstall
```
4. This will remove RTS Hypervisor tools and dkms packages. It will also delete /boot/efi/rth directory and content of /boot/efi/EFI/rts
5. To remove Integrated RTS Hypervisor entry from the BIOS setup menu, see section 8.3 “Change Default BIOS Entry (Optional)”.

### 8.3 Change Default BIOS Entry (Optional)

Follow the steps below to remove the Integrated RTS Hypervisor entry from the BIOS setup menu:

1. Restart the system. Press F2 or DEL during POST to enter the BIOS setup menu
2. Go to Boot tab and select 1<sup>st</sup> Boot Device in Boot Options Priority.
3. Disable the option for Integrated RTS Hypervisor
4. Select the option of your choice as Boot Option #1.

Go to Save & Exit table dn select “Save Changes and Exit”. The system restarts.

## 9 Troubleshooting

### 9.1 RthLdr.config not Found

```
RTH Loader
Copyright 2024 Real-Time Systems GmbH
Version: 1.0.00.81
-----
Config: Cannot locate the configuration file (Not Found)
EFI\rts\RthLdr.config
```

This message is displayed for a short time before the system automatically boots the General-Purpose Operating System (without RTS Hypervisor).

#### Possible Reasons:

- Firmware was configured before the installation package was installed.
- The RthLdr.config file was removed accidentally or during uninstallation.

#### Steps to Solve it:

- To get the RTS Hypervisor running again, download and install the software package as described in this Application Note.
- To use your module without RTS Hypervisor, disable the "Integrated RTS Hypervisor" from Boot Options Priority, under Boot tab in the BIOS setup menu.

### 9.2 Invalid License

```
Init shared memory
Init devices
ERR: 00000022 | 457FD904 | 80000000 | 00000000 | 00007000 | 00001000 | 0103409E
ERR: 00000022 | 457FD904 | 80000000 | 00000000 | 00007000 | 00001000 | 0103409E
ERR: 00000022 | 457FD904 | 80000000 | 00000000 | 00007000 | 00001000 | 0103409E
ERR: 00000022 | 457FD904 | 80000000 | 00000000 | 00007000 | 00001000 | 0103409E
ERR: 00000022 | 457FD904 | 80000000 | 00000000 | 00007000 | 00001000 | 0103409E
ERR: 00000022 | 457FD904 | 80000000 | 00000000 | 00007000 | 00001000 | 0103409E
ERR: 00000128 | 65536E01 | 000B4A48 | 000B4CBF | 00000000 | 00000000 | 01047F52
The license is not valid.
ERR: 00000075 | 5F0456EB | 00000000 | 00000000 | 00000000 | 01005FB5 | 0100A5CC
Hypervisor boot failed.
```

The message stays on the screen until you turn off the system and then turn it back on.

#### Possible Reasons:

- Evaluation license is expired. Contact congatec Sales team for more information.
- Accidentally using the settings of the evaluation license RthLdr.config for the RTS Hypervisor.

## 9.2.1 Steps to Solve it:

- Check that you are using the correct RthLdr.config file for your project. When in doubt, use “readtrace” to display your project number.
- Contact congatec Sales team for a valid license.

## 9.3 RTS Hypervisor Configuration Error

- Incorrect key use (cores and CPU options were configured together)

```
Init CPU
Init heap
Init registry
Read configuration
'cores' options must not be used together with CPU in /OS/0
Please check the Hypervisor Configuration.
ERR: 00000066 | 5ACE28BA | 00000000 | 00000000 | 00000000 | 00000000 | 0100A730
Number in section or key in the Hypervisor Configuration exceeds limit.
ERR: 00000075 | 5F0456E8 | 00000000 | 00000000 | 00000000 | 01005FB5 | 0100A5CC
Hypervisor boot failed.
```

- Issue with shared memory partition

```
Init CPU
Init heap
Init registry
Read configuration
Shared memory partition for "trace_partition_number" not found.
Please check the Hypervisor Configuration.
ERR: 00000090 | 474A7B51 | 63617274 | 00000000 | 00000000 | 00000000 | 0100A730
Shared memory partition for trace not found.
ERR: 00000075 | 5F0456E8 | 00000000 | 00000000 | 00000000 | 01005FB5 | 0100A5CC
Hypervisor boot failed.
```

### Note

***The messages stay on the screen until you turn off the system and then turn it back on.***

### Possible Reasons:

By applying manual changes to the RTS Hypervisor configuration file, you made changes to the RTS Hypervisor configuration that prevented your system from booting.

### Steps to solve it:

Press F11 during system boot and select your General-Purpose Operating System (without RTS Hypervisor). Revert to the original RTS Hypervisor configuration file in the download package.

## 10 How to get Access to Full Package

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For access to the full package, contact congatec Sales team via the online “Request Quote” form at <https://www.congatec.com/en/products/hypervisor-products/>.

After finalizing the sales procedure, you will get a new delivery package that includes the license.txt and RthLdr.config files. These files will override the included license to a full development and production license issued for your project.

Delivery of the full package version also includes additional components for further software development tasks (see section 7: “Offered Packages”)

## 11 Additional Support or Information

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For questions, recommendations or guidance contact [support@congatec.com](mailto:support@congatec.com). The support team will respond to your request while your evaluation license is valid.

If you purchase RTS Hypervisor, three support packages are available: Basic, Extended and Premium support. Contact congatec Sales team via the online “Request Quote” form at <https://www.congatec.com/en/products/hypervisor-products/>.