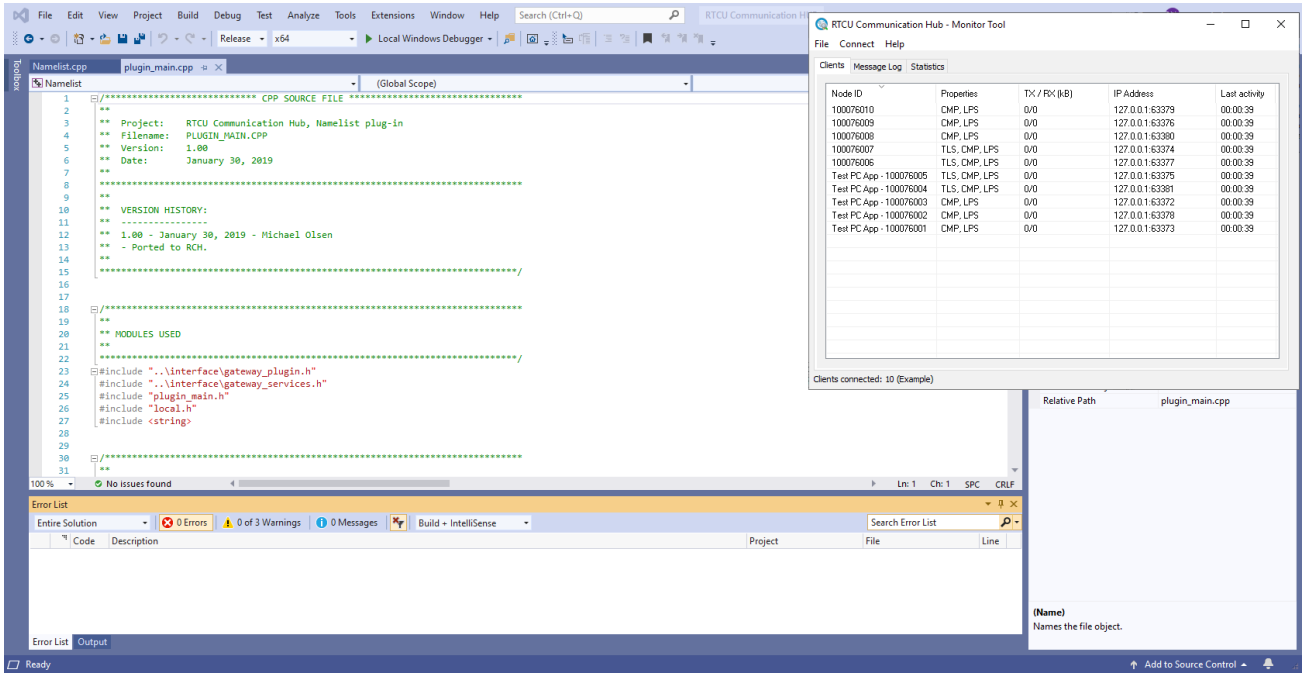
RTCU Communication Hub Plug-in

Developers Kit

Version 1.10



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Introduction

This document discusses the RTCU Communication Hub Plug-in Developers kit, which enables you to develop plug-ins to the RTCU Communication Hub (RCH).
A plug-in is a third-party software component that extends the RCH with new functionality.
It makes it possible to control which nodes are allowed to establish a connection with the RCH.
Connect and disconnect events can be received. The name of the nodes can be set, providing a better overview of the nodes.

An example of this is the blacklist standard plug-in included with the RCH, which lets you control which clients are allowed to log-on to the RCH.

RTCU Communication Hub Plug-in Developers kit vs. RTCU Gateway 2 Plug-in Developers Kit

The plug-in architecture used in the RCH has not changed from the RTCU Gateway 2, and is as such binary compatible.

Because of this, plug-ins built with the RTCU Gateway 2 Plug-in Developers Kit can still be used in the RCH. Despite this, we recommend that any plug-ins are rebuilt with the RTCU Communication Hub Plug-in Developers Kit.

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Contents of package

The package this document is part of, contains the following:

- RTCU Communication Hub Plug-in Developers Kit.pdf — This document
- \Plug-ins\ — Example plug-ins.

In order to develop plug-ins, you will need to use Microsoft Visual Studio C++ 2019 or newer.
The examples require Microsoft Visual Studio C++ 2019 or newer.

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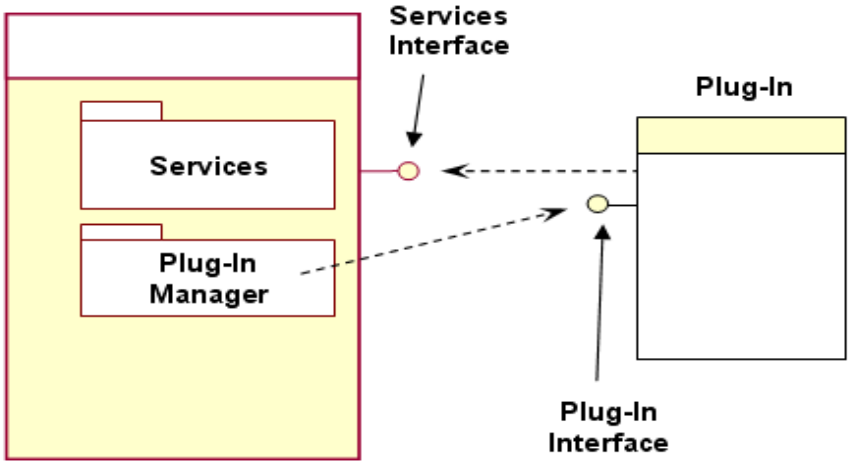
Plug-in interface

The plug-in interface can be described as the RCH providing services which the plug-in can use, including a way for plug-ins to register themselves with the RCH and a protocol for the exchange of data with plug-ins. Plug-ins depend on the services provided by the host application and do not usually work by themselves.

The interface consists of several functions that allow a plug-in to register, de-register and subscribe to several so-called services. It also offers to call an Invoke service which currently includes one function to write to the RCH logging system. A service denotes a specific event that the RCH can notify the plug-in about.
In addition, the plug-in may register properties which are user-configurable parameters that can be edited in the RTCU Communication Hub control panel and used by the plug-in.

The architecture of the plug-in interface is shown graphically below:



The function calling convention used is standard **__cdecl**.

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Loading the plug-in

Loading the plug-in is done in two steps,
1. loading the plug-in DLL into memory.
2. initializing the plug-in.

After the RCH has loaded the plug-in DLL, it will search for the entry point, GWPF_InitPlugin.
If the entry point is not found, the plug-in DLL will be released, and the RCH will move to the next plug-in.

The RCH will then call the entry point to initialize the plug-in.
Should the plug-in crash while in the entry point, the plug-in DLL will be released, and the RCH will move to the next plug-in.

When the entry point returns from the plug-in, the RCH will check if the plug-in is registered. If the plug-in is not registered, the RCH will call the exit point to close the plug-in, the plug-in DLL will be released, and the RCH will move to the next plug-in.
This last check is done to ensure that the plug-in and the RCH use a compatible version of the Plug-in Framework API.

DLL entry point GWPF_InitPlugin

Synopsis

```
gwpf_func_exit GWPF_InitPlugin(
                    const gwpf_gateway_services *Services);
```

Description

The entry point is responsible for initializing the plug-in and acquire the needed resources. (threads, handles, etc.)
The function is called by the RCH when loading the plug-in.
The function must be named 'GWPF_InitPlugin', and is the only function that is required to be exported by the plug-in DLL.

Input

Services	Services is a pointer to a structure that holds the parameters necessary for the plug-in to work with the RCH.

Returns The function must return a pointer to the exit point, as described below.

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Configuration parameter structure

Synopsis

```
typedef struct gwpf_gateway_services {
  gwpf_api_version    version;
  gwpf_func_register  registrar;
  gwpf_func_subscribe subscriber;
  gwpf_func_invoke    invoker;
  const char          *configuration;
} gwpf_gateway_services;
```

Description Stores the parameters for the plug-in to work with the RCH.

Fields

version	A structure that holds the Plug-in Framework API version the RCH is using.
registrar	Pointer to the function the plug-in must call to register with the RCH.
subscriber	Pointer to the function that the plug-in must use to subscribe to services.
invoker	Pointer to the function the plug-in must call to execute commands in the RCH. Should be stored for later use.
configuration	Pointer to a zero-terminated UTF-8 string that holds the configuration for the plug-in.

Plug-in Framework API version structure

Synopsis

```
typedef struct gwpf_api_version {
   int     major;
   int     minor;
} gwpf_api_version;
```

Description Stores the RCH plug-in framework API version.

Fields

major	Major version number.
minor	Minor version number.

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Exit function

Synopsis	`typedef void (*gwpf_func_exit)(void);`
Description	Used by the RCH to close the plug-in. Must release all acquired resources.
Returns	None.

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Registrar function

Synopsis

```
typedef int (*gwpf_func_register)(const char       *PluginName,
                                  gwpf_api_version *Version);
```

Description

The registrar is a function that the RCH passes to the plug-in when initializing it. The function verifies that the plug-in uses a compatible version of the Plug-in Framework API and then registers it.
The registrar must be called before the plug-in uses any other services from the RCH. If the registration fails, the RCH will perform a graceful close of the plug-in with the gwpf_func_exit function.

Input

PluginName	Zero terminated UTF8 string with the name of the plug-in that is registering.
Version	Pointer to structure containing the version of the API used by the plug-in.

Returns

0 Plug-in is registered successfully.

1 Plug-in is not found.

2 Plug-in is incompatible with the RCH.

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Subscribe function

Synopsis

```
typedef int (*gwpf_func_subscribe)(const char *PluginName,
                                   const int  ServiceID,
                                   void       *ServiceParams);
```

Description

The subscriber is a function that the RCH pass to the plug-in when initializing it. The function is used by the plug-in to subscribe to notifications from the RCH.
The events that the plug-in can subscribe to are listed in Control Panel Services (page 12) and Server Services (page 15).

Input

PluginName	PluginName is a zero-terminated UTF-8 string that contains the name of the plug-in, must be the same used to register the plug-in (see Registrar).
ServiceID	ServiceID is the ID number of the service to subscribe to.
ServiceParams	ServiceParams is a pointer to the parameters required to subscribe to the service.

Returns

0 Success

1 Plug-in is not found.

2 Plug-in has not been registered.

3 Unknown service

4 Invalid parameters.

5 This plug-in have already subscribed to the service or another plug-in have subscribed to this service and the service can only be used by a single plug-in.

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Invoker

Synopsis

```
typedef int (*gwpf_func_invoke)(const char *PluginName,
                                const int  ServiceID,
                                void       *ServiceParams);
```

Description

The invoker is a function that the RCH passes to the plug-in when initializing it. This function is used by the plug-in to access the services the RCH offers.
The services offered by the RCH is listed in Available Services.

Input

PluginName	Zero terminated UTF8 string with the name of the plug-in.
ServiceID	The ID number of the service to invoke.
ServiceParams	Pointer to the parameters required by the service.

Returns

0 Success.

1 Plug-in is not found.

2 Plug-in is disabled

3 Unknown service

4 Invalid parameters.

Other error codes as per individual service.

Configuration string

The configuration string is a UTF-8 zero-terminated string containing XML syntax.
The configuration string will have the following format:

```
<configuration>
   <property name="Enable">1</property>
   <property name="Folder">C:\Logs\Server\</property>
   ...
   <property name="...">...</property>
</configuration>
```

Each property from the configuration template (see below) will be in the configuration string.

It is recommended that an XML parser library is used to parse the incoming configuration string.

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Control Panel Services

The Control Panel supports the following service and will return 0 for all other services, without validating them.

Plug-in read information subscription

Service ID GWPF_SERVICE_READTEXT = 1

When adding the plug-in to the RCH, the Control Panel reads some information from the plug-in. This being, the plug-in name, the plug-in description, the plug-in version, and a template for configuration of the plug-in.
To read this information, the Control Panel loads the plug-in (using an empty configuration string) and then uses Read text notifications. Once all the information is read, the plug-in is unloaded again.

Therefore this function must at least be registered when the plug-in is initialized. Otherwise, the plug-in can not be added to the list of plug-ins.

gwpf_func_readtext

Synopsis

```
typedef char* (*gwpf_func_readtext)(const int Text);
```

Description The plug-in will get a series of requests for different static text information.
This is a service that all plug-ins must implement, as it is used to add the plug-in to the RCH.

Input

TextID	Id of the text information requested, it can be one of the following:

1	Request for the plug-in name.
2	Request for the plug-in description.
3	Request for the plug-in version.
4	Request for the plug-in configuration template.

Returns The text returned is expected to be a static zero-terminated UTF-8 string or an empty string if the information is not available

Registration parameter structure

Synopsis

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```
typedef struct gwpf_readtext_params {
   gwpf_func_readtext func;
} gwpf_readtext_params;
```

Description	This structure holds the parameters for registering the Plug-in text reader function with the RCH.

Input

func	A pointer to the callback function that is called to read the text information.

Configuration template

The configuration template text is a zero-terminated UTF-8 XML syntax string.

The XML file must have the following format:

```
<configuration>
   <property>
      <type>Bool</type>
      <name>Message log</name>
      <description>Enables/Disables adding details to the log.</description>
      <default>false</default>
   </property>
   ...
   <property>
      ...
   </property>
</configuration>
```


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A property group is added to the XML string for each property that the end-user can change.
The Plug-in Framework supports five different property types.

Type	Description
Bool	This type is an ON/OFF switch. It has the following parameters: **name**, **description**, and **default.** **The default** must be a value of 1, 0 (zero), True, or False.
Num	This type is a number. It has the following parameters: **name, description, default, max**, and **min.** **min** is the lowest value the property can have. **max** is the highest value the property can have. **The default** must be between min and max.
Text	This type is a text string. It has the following parameters: **name**, **description**, **default**, and **limit.** **The limit** is the maximum length; in characters, the text string can have. If the limit is zero, then no limit will be enforced.
File	This type is a path to a file on the hard disk. It has the following parameters: **name**, **description**, **default**, **ext**, and **filter.** **ext** is the file extension, for example,'*.xml'. **The filter** is the filter used by the find file dialog, for example,'All files (*.*)|*.*||'.
Folder	This type is a path to a directory on the hard disk. It has the following parameters: **name**, **description,** and **default.**

The name parameter for the properties is both shown in the plug-in configuration page in the Control Panel and used in the configuration string included in the plug-in initialization.

The description parameter is used to tell the user what the property is used for.

Please note that the Control Panel adds a property called 'Enable' to the template when adding the plug-in. This property is used to Enable/Disable the plug-in for each installed RCH.

Because of this, it is not possible to use a property with this name.

Only the listed parameters used by each type will be read, other unused tags will be ignored.

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Server Services

Log on

Service ID GWPF_SERVICE_LOGON = 3

gwpf_func_onlogon

Synopsis

```
typedef int (*gwpf_func_onlogon)(const long           NodeID,
                                 const char           *addr,
                                 const unsigned short port)
```

Description The plug-in will be notified by the RCH when a client tries to log on to the RCH before the RCH checks key and max client limit.
The plug-in can then decide to Accept or Reject the client.

Input

NodeID	The node id the client is requesting. 0 is dynamic.
addr	A zero-terminated string containing the IP address the client connects from, for example “192.168.0.1”.
port	IP port the client connects from.

Returns Returning zero from the callback function will reject the client log on, any other value will accept the client log on.

Registration parameter structure

Synopsis

```
typedef struct gwpf_service_onlogon_params {
   gwpf_func_onlogon   func;
} gwpf_service_onlogon_params;
```

Description This structure holds the parameters for subscribing to the “client log on attempt”.

Input

func	A pointer to the callback function.

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Connect

Service ID GWPF_SERVICE_CONNECT = 4

gwpf_func_onconnect

Synopsis

```
typedef void (*gwpf_func_onconnect)(const long NodeID)
```

Description The plug-in will be notified by the RCH when a client is connected to the RCH. (after successful logon)

Input

NodeID	The node id of the connected client.

Returns None.

Registration parameter structure

Synopsis

```
typedef struct gwpf_service_onconnect_params {
   gwpf_func_onconnect func;
} gwpf_service_onconnect_params;
```

Description This structure holds the parameters for subscribing to the client connected event.

Input

func	A pointer to the callback function.

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Close

Service ID GWPF_SERVICE_CLOSED = 5

gwpf_func_onclose

Synopsis

```
typedef void (*gwpf_func_onclose)(const long NodeID)
```

Description The plug-in will be notified by the RCH when a client is disconnected from the RCH.

Input

NodeID	The node id of the disconnected client

Returns None.

Registration parameter structure

Synopsis

```
typedef struct gwpf_service_onclose_params {
   gwpf_func_onclose func;
} gwpf_service_onclose_params;
```

Description This structure holds the parameters for subscribing to the “client closed event”.

Input

func	A pointer to the callback function.

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Look up names

Service ID GWPF_SERVICE_NAMELIST = 6

***Note**: This service can only be subscribed to by a single plug-in.*

gwpf_func_nameitem

Synopsis

```
typedef int (*gwpf_func_nameitem)(char *name,
                                  int  *name_len,
                                  long *node);
```

Description The plug-in will get a series of requests from the RCH while it iterates through the list of NodeID and Name pairs. The iteration is achieved by sending a request for the first pair and then sending a request for subsequent pairs until the plug-in returns No more names (3).

Input

name_len	Pointer to the variable that specifies the size, in bytes, of the buffer pointed to by the variable name. When the function returns success, this variable must contain the size of the data copied to name, including the zero-terminator. If the name is not large enough, the function must return length error and store the required size, including the zero-terminator, in the variable pointed to by name_len.

Output

name	Pointer to the buffer where the name of the node is stored. The name is expected to be a zero-terminated UTF-8 string.
node	Pointer to the variable that the NodeID is stored in.

Returns

0 The name and node id is returned.

1 One or more of the parameters are missing.

2 The name buffer is not large enough.

3 No more names in the list.

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Registration parameter structure

Synopsis

```
typedef struct gwpf_service_namelist_params {
   gwpf_func_nameitem first;
   gwpf_func_nameitem next;
} gwpf_service_namelist_params;
```

Description This structure holds the parameters for subscribing to the name lookup event.

Input

first	A callback function that is called to get the first NodeID and Name pair.
next	A callback function that is called to get the remaining NodeID and Name pairs.

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Heartbeat

Service ID GWPF_SERVICE_HEARTBEAT = 7

gwpf_func_heartbeat

Synopsis

```
typedef void (*gwpf_func_heartbeat)(const long NodeID,
                                    const int  Event);
```

Description The plug-in will be notified about the 'heartbeat online" and 'heartbeat offline' events.

Input

NodeID	The node id of the client effected by the event
Event	The heartbeat event: 1 Heartbeat online, the RCH has begun receiving heartbeats from the client. 2 Heartbeat offline, too much time has elapsed since the RCH received the last heartbeat from the client.

Returns None

Registration parameter structure

Synopsis

```
typedef struct gwpf_service_heartbeat_params {
   gwpf_func_heartbeat        func;
} gwpf_service_heartbeat_params;
```

Description This structure holds the parameters for subscribing to heartbeat events.

Input

func	A pointer to the callback function.

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Available Requests

Similar to subscriptions, except the structures must be given to invoke, to perform an action on the RCH.

Write to log

Service ID GWPF_SERVICE_LOG = 2

This request makes it possible to write messages to the RCH log.

Command parameter structure

Synopsis

```
typedef struct gwpf_service_log_params {
   int               type;
   const char        *message;
} gwpf_service_log_params;
```

Description This structure holds the parameters for inserting a message into the RCH log.

Input

type	Type of log message to add. 1 Error 2 Event 3 Detailed event
message	Pointer to zero-terminated UTF-8 text.

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