

## [MS-RDPET-Diff]:

# Remote Desktop Protocol: Telemetry Virtual Channel Extension

---

Intellectual Property Rights Notice for Open Specifications Documentation

- **Technical Documentation.** Microsoft publishes Open Specifications documentation (“this documentation”) for protocols, file formats, data portability, computer languages, and standards support. Additionally, overview documents cover inter-protocol relationships and interactions.
- **Copyrights.** This documentation is covered by Microsoft copyrights. Regardless of any other terms that are contained in the terms of use for the Microsoft website that hosts this documentation, you can make copies of it in order to develop implementations of the technologies that are described in this documentation and can distribute portions of it in your implementations that use these technologies or in your documentation as necessary to properly document the implementation. You can also distribute in your implementation, with or without modification, any schemas, IDLs, or code samples that are included in the documentation. This permission also applies to any documents that are referenced in the Open Specifications documentation.
- **No Trade Secrets.** Microsoft does not claim any trade secret rights in this documentation.
- **Patents.** Microsoft has patents that might cover your implementations of the technologies described in the Open Specifications documentation. Neither this notice nor Microsoft's delivery of this documentation grants any licenses under those patents or any other Microsoft patents. However, a given Open Specifications document might be covered by the Microsoft [Open Specifications Promise](#) or the [Microsoft Community Promise](#). If you would prefer a written license, or if the technologies described in this documentation are not covered by the Open Specifications Promise or Community Promise, as applicable, patent licenses are available by contacting [iplg@microsoft.com](mailto:iplg@microsoft.com).
- **License Programs.** To see all of the protocols in scope under a specific license program and the associated patents, visit the [Patent Map](#).
- **Trademarks.** The names of companies and products contained in this documentation might be covered by trademarks or similar intellectual property rights. This notice does not grant any licenses under those rights. For a list of Microsoft trademarks, visit [www.microsoft.com/trademarks](http://www.microsoft.com/trademarks).
- **Fictitious Names.** The example companies, organizations, products, domain names, email addresses, logos, people, places, and events that are depicted in this documentation are fictitious. No association with any real company, organization, product, domain name, email address, logo, person, place, or event is intended or should be inferred.

**Reservation of Rights.** All other rights are reserved, and this notice does not grant any rights other than as specifically described above, whether by implication, estoppel, or otherwise.

**Tools.** The Open Specifications documentation does not require the use of Microsoft programming tools or programming environments in order for you to develop an implementation. If you have access to Microsoft programming tools and environments, you are free to take advantage of them. Certain Open Specifications documents are intended for use in conjunction with publicly available standards specifications and network programming art and, as such, assume that the reader either is familiar with the aforementioned material or has immediate access to it.

**Support.** For questions and support, please contact [dochelp@microsoft.com](mailto:dochelp@microsoft.com).

## Revision Summary

Date	Revision History	Revision Class	Comments
11/14/2013	1.0	New	Released new document.
2/13/2014	1.0	None	No changes to the meaning, language, or formatting of the technical content.
5/15/2014	1.0	None	No changes to the meaning, language, or formatting of the technical content.
6/30/2015	2.0	Major	Significantly changed the technical content.
10/16/2015	2.0	None	No changes to the meaning, language, or formatting of the technical content.
7/14/2016	2.0	None	No changes to the meaning, language, or formatting of the technical content.
<u>6/1/2017</u>	<u>2.0</u>	<u>None</u>	<u>No changes to the meaning, language, or formatting of the technical content.</u>

# Table of Contents

<b>1</b>	<b>Introduction</b>	<b>4</b>
1.1	Glossary	4
1.2	References	4
1.2.1	Normative References	4
1.2.2	Informative References	4
1.3	Overview	5
1.4	Relationship to Other Protocols	5
1.5	Prerequisites/Preconditions	5
1.6	Applicability Statement	5
1.7	Versioning and Capability Negotiation	5
1.8	Vendor-Extensible Fields	5
1.9	Standards Assignments	5
<b>2</b>	<b>Messages</b>	<b>6</b>
2.1	Transport	6
2.2	Message Syntax	6
2.2.1	RDP_TELEMETRY_PDU	6
<b>3</b>	<b>Protocol Details</b>	<b>8</b>
3.1	Server Details	8
3.1.1	Abstract Data Model	8
3.1.2	Timers	8
3.1.3	Initialization	8
3.1.4	Higher-Layer Triggered Events	8
3.1.5	Processing Events and Sequencing Rules	8
3.1.5.1	Processing RDP_TELEMETRY_PDU	8
3.1.6	Timer Events	8
3.1.7	Other Local Events	8
3.2	Client Details	8
3.2.1	Abstract Data Model	8
3.2.2	Timers	8
3.2.3	Initialization	8
3.2.4	Higher-Layer Triggered Events	9
3.2.5	Processing Events and Sequencing Rules	9
3.2.5.1	Sending RDP_TELEMETRY_PDU	9
3.2.6	Timer Events	9
3.2.7	Other Local Events	9
<b>4</b>	<b>Protocol Examples</b>	<b>10</b>
<b>5</b>	<b>Security</b>	<b>11</b>
5.1	Security Considerations for Implementers	11
5.2	Index of Security Parameters	11
<b>6</b>	<b>Appendix A: Product Behavior</b>	<b>12</b>
<b>7</b>	<b>Change Tracking</b>	<b>13</b>
<b>8</b>	<b>Index</b>	<b>14</b>

# 1 Introduction

This document specifies the Remote Desktop Protocol: Telemetry Virtual Channel Extension to the Remote Desktop Protocol: Basic Connectivity and Graphics Remoting, as specified in [MS-RDPBCGR]. The telemetry protocol defined in section 2.2 is used to send client performance metrics to the server, thus providing a way to collate statistics about the quality of the RDP experience.

Sections 1.5, 1.8, 1.9, 2, and 3 of this specification are normative. All other sections and examples in this specification are informative.

## 1.1 Glossary

This document uses the following terms:

**ANSI character:** An 8-bit Windows-1252 character set unit.

**little-endian:** Multiple-byte values that are byte-ordered with the least significant byte stored in the memory location with the lowest address.

**terminal server:** A computer on which terminal services is running.

**MAY, SHOULD, MUST, SHOULD NOT, MUST NOT:** These terms (in all caps) are used as defined in [RFC2119]. All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

## 1.2 References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the Errata.

### 1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information.

[MS-RDPBCGR] Microsoft Corporation, "Remote Desktop Protocol: Basic Connectivity and Graphics Remoting".

[MS-RDPEDYC] Microsoft Corporation, "Remote Desktop Protocol: Dynamic Channel Virtual Channel Extension".

[MS-RDPEGFX] Microsoft Corporation, "Remote Desktop Protocol: Graphics Pipeline Extension".

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <http://www.rfc-editor.org/rfc/rfc2119.txt>

### 1.2.2 Informative References

None.

### **1.3 Overview**

The Remote Desktop Protocol: Telemetry Virtual Channel Extension consists of a single client-to-server PDU (section 2.2.1) sent over an RDP dynamic virtual channel (section 2.1) every time a connection is established.

### **1.4 Relationship to Other Protocols**

The Remote Desktop Protocol: Telemetry Virtual Channel Extension is embedded in a dynamic virtual channel transport, as specified in [MS-RDPEDYC] sections 1 to 3.

### **1.5 Prerequisites/Preconditions**

The Remote Desktop Protocol: Telemetry Virtual Channel Extension operates only after the dynamic virtual channel transport is fully established. If the dynamic virtual channel transport is terminated, the Remote Desktop Protocol: Telemetry Virtual Channel Extension is also terminated. The protocol is terminated by closing the underlying virtual channel. For details about closing the dynamic virtual channel, see [MS-RDPEDYC] section 3.1.5.2.

### **1.6 Applicability Statement**

The Remote Desktop Protocol: Telemetry Virtual Channel Extension is applicable in scenarios where a mechanism to transmit telemetry data to a terminal server is required.

### **1.7 Versioning and Capability Negotiation**

None.

### **1.8 Vendor-Extensible Fields**

None.

### **1.9 Standards Assignments**

None.

## 2 Messages

### 2.1 Transport

The Remote Desktop Protocol: Telemetry Virtual Channel Extension is designed to operate over a dynamic virtual channel, as specified in [MS-RDPEDYC] sections 1 to 3. The dynamic virtual channel name is the null-terminated ANSI character string "Microsoft::Windows::RDS::Telemetry". The usage of channel names in the context of opening a dynamic virtual channel is specified in [MS-RDPEDYC] section 2.2.2.1.

### 2.2 Message Syntax

The following sections specify the Remote Desktop Protocol: Telemetry Virtual Channel Extension message syntax.

All multiple-byte fields within a message MUST be marshaled in little-endian byte order, unless otherwise specified.

#### 2.2.1 RDP\_TELEMETRY\_PDU

The **RDP\_TELEMETRY\_PDU** message is a client-to-server PDU that is used to transmit metrics with respect to the time it took the client to complete a fully functional connection to the server.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Id								Length								PromptForCredentialsMillis															
...								...								PromptForCredentialsDoneMillis															
...								...								GraphicsChannelOpenedMillis															
...								...								FirstGraphicsReceivedMillis															
...								...								...															

**Id (1 byte):** An 8-bit unsigned integer that MUST contain the value 0x01.

**Length (1 byte):** An 8-bit unsigned integer that specifies the length, in bytes, of the PDU. This field MUST be set to 0x12.

**PromptForCredentialsMillis (4 bytes):** A 32-bit unsigned integer that specifies the difference, in milliseconds, between the time when the connection was initiated, and the time when a credentials prompt dialog was shown to the user. This value MUST be zero if no credentials prompt dialog was displayed.

**PromptForCredentialsDoneMillis (4 bytes):** A 32-bit unsigned integer that specifies the difference, in milliseconds, between the time when the connection was initiated, and the time when credentials were successfully provided by the user. This value MUST be zero if no credentials prompt dialog was displayed.

**GraphicsChannelOpenedMillis (4 bytes):** A 32-bit unsigned integer that specifies the difference, in milliseconds, between the time when the connection was initiated, and the time when the Remote Desktop Protocol: Graphics Pipeline Extension dynamic virtual channel ([MS-RDPEGFX] section 2.1) was accepted by the client.

**FirstGraphicsReceivedMillis (4 bytes):** A 32-bit unsigned integer that specifies the difference in milliseconds, between the time when the connection was initiated, and the time when the first Desktop Protocol: Graphics Pipeline Extension graphics message ([MS-RDPEGFX] section 2.2) was received by the client.

## 3 Protocol Details

### 3.1 Server Details

#### 3.1.1 Abstract Data Model

None.

#### 3.1.2 Timers

None.

#### 3.1.3 Initialization

None.

#### 3.1.4 Higher-Layer Triggered Events

None.

#### 3.1.5 Processing Events and Sequencing Rules

##### 3.1.5.1 Processing RDP\_TELEMETRY\_PDU

The structure and fields of the RDP\_TELEMETRY\_PDU message are specified in section 2.2.1. Processing of this message is optional. Upon receiving this message, the server SHOULD log an event with the connection information contained in the **PromptForCredentialsMillis**, **PromptForCredentialsDoneMillis**, **GraphicsChannelOpenedMillis** and **FirstGraphicsReceivedMillis** fields.

#### 3.1.6 Timer Events

None.

#### 3.1.7 Other Local Events

None.

### 3.2 Client Details

#### 3.2.1 Abstract Data Model

None.

#### 3.2.2 Timers

None.

#### 3.2.3 Initialization

None.



### **3.2.4 Higher-Layer Triggered Events**

None.

### **3.2.5 Processing Events and Sequencing Rules**

#### **3.2.5.1 Sending RDP\_TELEMETRY\_PDU**

The structure and fields of the RDP\_TELEMETRY\_PDU message are specified in section 2.2.1. The message fields **MUST** be populated in accordance with this description. Transmission of the RDP\_TELEMETRY\_PDU message to the server is optional.

### **3.2.6 Timer Events**

None.

### **3.2.7 Other Local Events**

None.

## 4 Protocol Examples

None.

## **5 Security**

### **5.1 Security Considerations for Implementers**

None.

### **5.2 Index of Security Parameters**

None.

## 6 Appendix A: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs.

- Windows 8.1 operating system
- Windows Server 2012 R2 operating system
- Windows 10 operating system
- Windows Server 2016 operating system

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms SHOULD or SHOULD NOT implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that the product does not follow the prescription.

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms "SHOULD" or "SHOULD NOT" implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term "MAY" implies that the product does not follow the prescription.

## 7 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.

## 8 Index

### A

Abstract data model  
  client 8  
  server 8  
Applicability 5

### C

Capability negotiation 5  
Change tracking 13  
Client  
  abstract data model 8  
  higher-layer triggered events 9  
  initialization 8  
  local events 9  
  other local events 9  
  RDP\_TELEMETRY\_PDU message 9  
  timer events 9  
  timers 8

### D

Data model - abstract  
  client 8  
  server 8

### F

Fields - vendor-extensible 5

### G

Glossary 4

### H

Higher-layer triggered events  
  client 9  
  server 8

### I

Implementer - security considerations 11  
Index of security parameters 11  
Informative references 4  
Initialization  
  client 8  
  server 8  
Introduction 4

### M

Messages  
  RDP\_TELEMETRY\_PDU 6  
  syntax 6  
  transport 6

### N

Normative references 4

## O

- Other local events
  - client 9
  - server 8
- Overview (synopsis) 5

## P

- Parameters - security index 11
- Preconditions 5
- Prerequisites 5
- Product behavior 12
- Protocol examples 10

## R

- RDP\_TELEMETRY\_PDU message 6
- RDP\_TELEMETRY\_PDU message - client 9
- RDP\_TELEMETRY\_PDU message - server 8
- RDP\_TELEMETRY\_PDU packet 6
- References 4
  - informative 4
  - normative 4
- Relationship to other protocols 5

## S

- Security
  - implementer considerations 11
  - parameter index 11
- Server
  - abstract data model 8
  - higher-layer triggered events 8
  - initialization 8
  - local events 8
  - other local events 8
  - RDP\_TELEMETRY\_PDU message 8
  - timer events 8
  - timers 8
- Standards assignments 5

## T

- Timer events
  - client 9
  - server 8
- Timer events - server 8
- Timers
  - client 8
  - server 8
- Tracking changes 13
- Transport 6
- Triggered events - higher-layer
  - client 9
  - server 8

## V

- Vendor-extensible fields 5
- Versioning 5