WCS Core logs

Logging settings

WCS Core logging is handled by the log4j.properties config and a number of settings in flashphoner.properties:

Logging settings in flashphoner.properties

Setting	Default value
client_log_level	INFO
client_dump_level	0
enable_extended_logging	true

Logs are recorded to /usr/local/FlashphonerWebCallServer/logs

- client_logs - logs recorded on the server side that correspond to the WCS server client session (client logs).
- server_logs - general logs recorded on the server side.

Logging settings in log4j.properties

This is a standard config of the log4j format.

```
mc - root@localhost:/usr/local/FlashphonerWebCallServer-3.0.1011/conf
log4j.properties   [----]  0 L:[  1+ 0   1/ 40] *(0   /2269b)= 1 108 0x6C
log4j.rootLogger=info, stdout, fAppender

log4j.logger.incoming.Publication=info, incoming_publication
log4j.logger.outgoing.Publication=info, outgoing_publication
log4j.logger.pushLogs.FlashphonerHandler=info, clientLog
log4j.additivity.incoming.Publication=false
log4j.additivity.outgoing.Publication=false
log4j.additivity.pushLogs.FlashphonerHandler=false

log4j.logger.sipMessages=DEBUG
#log4j.logger.send.SentMessageControl=DEBUG
#log4j.logger.send.BurstAvoidanceController=DEBUG
#log4j.logger.send.FlowWriter=DEBUG
log4j.appender.stdout=org.apache.log4j.ConsoleAppender
log4j.appender.stdout.layout=org.apache.log4j.PatternLayout
log4j.appender.stdout.layout.ConversionPattern=%d{HH:mm:ss,SSS} %-5p %20.20c{1} - %m%n

log4j.appender.fAppender=org.apache.log4j.DailyRollingFileAppender
log4j.appender.fAppender.DatePattern='.'yyyy-MM-dd-HH
log4j.appender.fAppender.layout=org.apache.log4j.PatternLayout
log4j.appender.fAppender.layout.ConversionPattern=%d{HH:mm:ss,SSS} %-5p %20.20c{1} - %t %m%n
log4j.appender.fAppender.File=${com.flashphoner.fms.AppHome}/logs/server_logs/flashphoner.log

log4j.appender.incoming_publication=org.apache.log4j.DailyRollingFileAppender
log4j.appender.incoming_publication.DatePattern='.'yyyy-MM-dd-HH
log4j.appender.incoming_publication.layout=org.apache.log4j.PatternLayout
log4j.appender.incoming_publication.layout.ConversionPattern=%m%n
log4j.appender.incoming_publication.File=${com.flashphoner.fms.AppHome}/logs/stats/flashphoner-incoming-publications.log

log4j.appender.outgoing_publication=org.apache.log4j.DailyRollingFileAppender
log4j.appender.outgoing_publication.DatePattern='.'yyyy-MM-dd-HH
log4j.appender.outgoing_publication.layout=org.apache.log4j.PatternLayout
log4j.appender.outgoing_publication.layout.ConversionPattern=%m%n
log4j.appender.outgoing_publication.File=${com.flashphoner.fms.AppHome}/logs/stats/flashphoner-outgoing-publications.log

log4j.appender.clientLog=org.apache.log4j.DailyRollingFileAppender
log4j.appender.clientLog.DatePattern='.'yyyy-MM-dd-HH
log4j.appender.clientLog.layout=org.apache.log4j.PatternLayout
log4j.appender.clientLog.layout.ConversionPattern=%d{HH:mm:ss,SSS}  %m%n
log4j.appender.clientLog.File=${com.flashphoner.fms.AppHome}/logs/client_logs/flashphoner-client-logs.log

1Help  2Save  3Mark  4Replac 5Copy  6Move  7Search 8Delete 9PullDn 10Quit
```

Settings description

Attribute	Value	Description
log4j.rootLogger	info, stdout, fAppender	Root logger. info - INFO logging level. More detailed levels, for example, DEBUG and TRACE, and less detailed, for example, ERROR are available. stdout, fAppender - set how and where logs are output.
log4j.logger.incoming.Publication	info, incoming_publication	RTMFP-SIP calls statistics logger for the traffic incoming from a SIP server. info - logging level incoming_publication - sets how and where logs are output.
log4j.logger.outgoing.Publication	info, outgoing_publication	RTMFP-SIP calls statistics logger for the traffic outgoing to a SIP server. info - logging level outgoing_publication - sets how and where logs are output.
log4j.logger.pushLogs.FlashphonerHandler	Not used	Not used
log4j.additivity.incoming.Publication	false	Do not add these logs to the general log, recording them as individual logs instead
log4j.additivity.outgoing.Publication	false	Do not add these logs to the general log, recording them as individual logs instead
log4j.logger.sipMessages	debug	Put inbound and outgoing SIP messages to the log
log4j.logger.WSServerHandler	trace	Put outgoing Websocket messages to the log

log4j.logger.WSClient	debug	Put incoming Websocket messages to the log
log4j.appender.stdout	org.apache.log4j.ConsoleAppender	Output logs to stdout
log4j.appender.fAppender	org.apache.log4j.DailyRollingFileAppender	Output logs to fAppender
log4j.appender.incoming_publication	org.apache.log4j.DailyRollingFileAppender	Output RTMFP statistics to incoming_publication
log4j.appender.outgoing_publication	org.apache.log4j.DailyRollingFileAppender	Output RTMFP statistics to outgoing_publication
log4j.appender.clientLog	org.apache.log4j.DailyRollingFileAppender	Not used

Logging settings hot swapping

WCS automatically catches changes made to the log4j.properties file. This is convenient for debugging purposes and to receive additional logs without restarting the server. For instance, when you need to enable more detailed logs and change the output format of logs. However, for higher reliability during production, we recommend restarting the WCS server nevertheless.

Websocket messages tracing

For debugging purpose, or to develop your own API, all Websocket messages tracing except transport ones may be enabled. To log all incoming\outgoing Websocket messages to websocket.log file in/usr/local/FlashphonerWebCallServer/logs/server_logs directory, the following strings should be added tolog4j.properties file:

```
log4j.logger.WSServerHandler=trace, wsAppender
log4j.logger.WSClient=debug, wsAppender
log4j.appender.wsAppender=org.apache.log4j.DailyRollingFileAppender
log4j.appender.wsAppender.DatePattern='.'yyyy-MM-dd-HH
log4j.appender.wsAppender.layout=org.apache.log4j.PatternLayout
log4j.appender.wsAppender.layout.ConversionPattern=%d{HH:mm:ss,SSS} %-5p %20.20c{1} - %t %m%n
log4j.appender.wsAppender.File=${com.flashphoner.fms.AppHome}/logs/server_logs/websocket.log
```

Client logs

Switching on, off and managing logging level

Client logs are logs on the server that are relevant to a web client session. Client logs are only recorded to client_logs if the enable_extended_logging=true setting is enabled (by default)

```
enable_extended_logging=true
```

To switch client logging off the following should be set inflashphoner.propertiesfile

```
enable_extended_logging=false
```

You can configure the logging detail level using the client_log_level setting that can assume the following values: ERROR, INFO, DEBUG, TRACE.By default

```
client_log_level=INFO
```

It is recommended to use cron in conjuction with find to periodically purge client logs. For example, to check for outdated logs every 24 hours and delete all logs older than 30 days add the following cron task

```
0 0 * * * find /usr/local/FlashphonerWebCallServer/logs/client_logs/ -type d -mtime +30 | xargs rm -rf
```

Logging level managing "on the fly"

Logging level for certain session may be changed on the go, without server restart. To do this, REST queries are used

REST query should be HTTP/HTTPS POST request such as:

- HTTP:http://test.flashphoner.com:8081/rest-api/logger/enable_client_log
- HTTPS:https://test.flashphoner.com:8444/rest-api/logger/enable_client_log

Here:

- test.flashphoner.comis WCS server address
- 8081 is WCS standard REST / HTTP port
- 8444is WCS standard HTTPS port
- rest-api is required URL prefix
- /logger/enable_client_logis REST method used

REST methods and response statuses

REST method	Example of REST request	Example of REST response	Response status	Description
/logger /enable_client_log	`{ "sessionId": "/127.0.0.1:57539/192.168.1.101:8443", "logLevel": "DEBUG" }`		200 - Logging level is changed 404 - Session not found	Set the logging level specified in session specified
/logger /disable_client_log	`{ "sessionId": "/127.0.0.1:57539/192.168.1.101:8443" }`		200 - Logging is disabled 404 - Session not found	Fully disable logging in session specified

Parameters

Parameter name	Description	Example
sessionId	Session Id	`/127.0.0.1:57539/192.168.1.101:8443`
logLevel	Logging level to set	DEBUG

Thus, when problem occurs with stream published on server (for example, the stream is published but cannot be played), REST query should be sent to server to switch logging level to DEBUG and then, when problem is reproduced and data are collected, to switch logging level back to INFO. Also it is possible to switch logging off in certain client session.

Logging level changes with REST queries affects only the session specified, but not another sessions including sessions that will be created later.

Enabling debug log for all the client sessions

To diagnose a problem, sometimes it is necessary to enable debug logging for all newly connected client sessions, to write to client logs connection establishing process and stream publishing start. This feature can be enabled since build5.2.512with the following parameter

```
client_log_force_debug=true
```

For all newly connected clients debug logs will be recorded during interval defined with the following parameter in seconds

```
client_log_force_debug_timeout=60
```

By default client debug logs will be written in 60 seconds for each session connected.

These settings can be changed win CLI and applied without server restart.

Using flight recorder

Flight recorder function allows to cyclically write some latest events for stream published. This information may help to diagnose problems with stream publishing without full client debug logs enabling. Flight recorder is enabled with the following parameter inflashphoner.propertiesfile

```
enable_flight_recorder=true
```

It is necessary to set events category that will be written (defined by developer)

```
flight_recorder_categories=WCS1438
```

The events are written for publisher client to flight_recorder.log file, if stream publishing stops by some error, or stream is corrupted by some way.

To test flight recorder, the parameter should be set

```
enable_flight_recorder_test=true
```

without restarting WCS server. It saves the events to file for all publishers connected.

> The `enable_flight_recorder_test` parameter is not intended to use in production

Client log structure and content

Client logs structure:

```
client_logs
---- 2018-05-16
-------- 84gij60a6u3ni7docsr1di1l5b-15-06-59
------------ flashphoner.log
------------ client-84gij60a6u3ni7docsr1di1l5b-2018.05.16.15.07.26-1526458046646.report
------------ MediaDump-85d65b00-639e-4a7e.31002-31004-31006-31008.pcap
```

flashphoner.log log

Client logs are recorded to client_logs by dates. For each date, a directory is created with the name formatted as YYYY-MM-DD, for instance, 2018-05-16.
When the web client establishes connection to the server, a folder for the current client session is created inside the date folder, for example, 84gij60a6u3ni7docsr1di1l5b-15-06-59, where 84gij60a6u3ni7docsr1di1l5b is a session identifier, 15 is hours, 06 is minutes, 59 is seconds. In the same directory the flashphoner.log file is recorded, which contains only those server events that are relevant to this specific client session. Hence, we see when the client connected to the server, and what logs were recorded for this client's session.

client-report log

This is an additional client log. The web client has a special WCS JavaScript API function 'pushLog'. This function sends to the WCS server logs recorded on the browser side. All logs received from the web client using pushLog are saved on the server. When the web client ends a session with the WCS server, the received logs are recorded to the client-84gij60a6u3ni7docsr1di1l5b-2018.05.16.15.07.26-1526458046646.report file, where 84gij60a6u3ni7docsr1di1l5b is a session identifier, 2018 is year, 05 is month, 26 is day, 15 is hours, 07 is minutes, 26 is seconds, 1526458046646 is milliseconds.

Media traffic dumps

If in theflashphoner.propertiessettings file a non-zero value is set for the client_dump_level setting, a dump session is additionally recorded for a client:

- if client_dump_level=1, only SIP traffic is recorded;
- if client_dump_level=2, all media traffic is recorded.

Traffic is recorded using tcpdump, if this utility is installed in the system.

flight_recorder.log log

Last events for stream published are written to this file.

Server logs

WCS Core records general server logs to logs/server_logs

```
server_logs
---- flashphoner.log
---- flashphoner.log.2018-05-17-16
```

In these logs you can track start of the server and its starting settings:

```
tail -f flashphoner.log
```

Server startup

```
17:35:21,682 INFO                Config - main Patches NOT installed
17:35:21,683 INFO                Config - main NODE_ID: Op8P1bTHDacuaVfAELoJgcOFiWDYY6NL@0.0.0.0
17:35:21,693 INFO        SettingsLoader - main Flashphoner config has been validated success
17:35:21,693 INFO        SettingsLoader - main Server properties have been loaded:
{media_port_to=32000, wss.port=8443, burst_avoidance_count=100, wss.cert.password=password, get_callee_url=/usr/local/FlashphonerWebCall
17:35:21,953 INFO        SettingsLoader - main Override setting media_port_to: from 32000 to 32000
17:35:21,985 INFO        SettingsLoader - main Override setting wss.port: from 8443 to 8443
17:35:21,985 INFO        SettingsLoader - main Override setting wss.cert.password: from password to password
17:35:21,985 INFO        SettingsLoader - main Override setting burst_avoidance_count: from null to 100
17:35:21,986 INFO        SettingsLoader - main Override setting get_callee_url: from null to /usr/local/FlashphonerWebCallServer/conf/ca
17:35:21,986 WARN              Settings - main Setting 'log_level' is not found. Please check setting.
17:35:21,986 INFO        SettingsLoader - main Override setting flush_video_interval: from 80 to 0
17:35:21,986 INFO        SettingsLoader - main Override setting audio_frames_per_packet: from -1 to 6
17:35:21,986 INFO        SettingsLoader - main Override setting call_record_listener: from null to com.flashphoner.server.client.Default
17:35:21,986 WARN              Settings - main Setting 'waiting_answer' is not found. Please check setting.
17:35:21,986 INFO        SettingsLoader - main Override setting on_record_hook_script: from null to on_record_hook.sh
17:35:21,987 INFO        SettingsLoader - main Override setting keep_alive.peer_interval: from 2000 to 2000
17:35:21,987 WARN              Settings - main Setting 'enable_context_logs' is not found. Please check setting.
17:35:21,987 INFO        SettingsLoader - main Override setting keep_alive.server_interval: from 5000 to 5000
17:35:21,987 INFO        SettingsLoader - main Override setting ip_local: from 0.0.0.0 to 95.191.131.64
17:35:21,987 INFO        SettingsLoader - main Override setting codecs_exclude_streaming: from null to flv,telephone-event
17:35:21,987 INFO        SettingsLoader - main Override setting balance_header: from null to balance
17:35:21,987 INFO        SettingsLoader - main Override setting domain: from null to
17:35:21,988 INFO        SettingsLoader - main Override setting audio_reliable: from partial to partial
17:35:21,988 INFO        SettingsLoader - main Override setting codecs_exclude_sip_rtmp: from null to opus,g729,g722,mpeg4-generic,vp8,m
17:35:21,988 INFO        SettingsLoader - main Override setting user_agent: from Flashphoner/1.0 to Flashphoner/1.0
17:35:21,988 INFO        SettingsLoader - main Override setting rtmp_transponder_stream_name_prefix: from null to rtmp_
17:35:21,988 INFO        SettingsLoader - main Override setting video_reliable: from partial to partial
17:35:21,988 INFO        SettingsLoader - main Override setting codecs: from null to opus,alaw,ulaw,g729,speex16,g722,mpeg4-generic,tele
```

Shutting down the server

```
17:34:37,209 INFO       ShutdownHandler - Thread-15 Shutting down RTMP Connections
17:34:37,211 INFO       ShutdownHandler - Thread-21 Shutting down Rtsp sessions
17:34:37,210 INFO  ativeShutdownHandler - Thread-6 Shutting down native libs
17:34:37,214 INFO       ShutdownHandler - Thread-18 Shutting down RTMFP Connections
17:34:37,214 INFO              Sessions - Thread-18 shutdown
17:34:37,214 INFO       ShutdownHandler - Thread-18 RTMFP connections closed
17:34:37,219 INFO       ShutdownHandler - Thread-15 RTMP connections closed
17:34:37,219 INFO       ShutdownHandler - Thread-21 Rtsp sessions closed
17:34:37,221 INFO       ShutdownHandler - Thread-20 Shutting down WebSocket connections
17:34:37,222 INFO       ShutdownHandler - Thread-20 WebSocket connections closed
17:34:37,222 INFO       ShutdownHandler - Thread-19 Shutting down WebSocket connections
17:34:37,223 INFO       ShutdownHandler - Thread-19 WebSocket connections closed
17:34:37,236 INFO  ativeShutdownHandler - Thread-6 Done
```

Licensing information:

```
17:35:22,722 INFO  SipUserAgentListener - main License details
Activation date: 2018.04.09
Expiration date: 2017.10.22
Name: ************
Company: Flashphoner
Product name: Web Call Server 5
Features: [wcs_rtmfp2rtmfp_broadcasting, wcs_sip_as_rtmp, rtc2sip_vp8, flash2sip_h264, flash2sip_h263, wcs_webrtc_screen_sharing, rtc_au
LicenseNumber: ********-****-****-****-************
LicenseType: Subscription
LicenseSc: -1
HardwareId: 25349A0AF0B4E6EEB9EA9168BEED41DE83E47A190FF571AF38D0157DAA7D3FB45559F70ACB8B7BB40D5B4B9FBB6B72494204DBFF495B798C28D6D4237E5C
Support: Monthly subscription basic support
```

Besides, REST hooks queries information is displayed in server logs:

```
08:01:06,649 INFO            RestClient - API-ASYNC-pool-8-thread-2 SEND REST OBJECT ==>
URL:http://localhost:8081/EchoApp/StreamStatusEvent
OBJECT:
{
  "nodeId" : "rR3YA7yKB11iIIID4XkYveTF8ePhezMU@0.0.0.0",
  "appKey" : "defaultApp",
  "sessionId" : "/5.44.168.45:58541/95.191.131.65:8443",
  "mediaSessionId" : "58488550-99dd-11e8-bf13-9b5947c0a0f5",
  "name" : "569a",
  "published" : true,
  "hasVideo" : true,
  "hasAudio" : true,
  "status" : "PUBLISHING",
  "audioCodec" : "opus",
  "videoCodec" : "H264",
  "info" : "Unknown",
  "record" : false,
  "width" : 0,
  "height" : 0,
  "bitrate" : 0,
  "minBitrate" : 0,
  "maxBitrate" : 0,
  "quality" : 0,
  "timeShift" : -1,
  "createDate" : 1533603665644,
  "mediaProvider" : "WebRTC",
  "history" : false,
  "origin" : "https://test.flashphoner.com:8888"
}
```

Therefore, server logs offer general information about server operation. You can receive more detailed information in logs that are recorded individually for each client session.

CDR logs

Call Detail Record is a SIP calls log.

CDR records are added to a log file located atlogs/cdr/cdr.log. A new log file is created every 24 hours. Data are recorded as a CSV file, so they can be easily processed.

Field names are not recorded to the file.

Record format:

```
src;dst,cid,start,answer,end,billsec,disposition
```

Record example:

```
3000;3001;f294f6116bf2cc4c725f20457ed76e5b@192.168.56.2;2014-11-21 15:01:37; 2014-11-21 15:01:41; 2014-11-21 15:
02:45;64;ANSWERED
```

Field	Description
src	Caller
dst	Callee
cid	Call identifier
start	Call start (date and time).
answer	Date and time the call is answered by the subscriber or the SIP side.
end	Date and time the call ended.
billsec	Time in seconds between 'answer' and 'end'.

disposition	Call result:*ANSWERED, NO_ANSWER, BUSY, FAILED*.

MDR logs

Message Detail Record is a SIP messages log.

MDR records are added to a log file located atlogs/cdr/mdr.log. A new log file is created every 24 hours. Data are recorded as a CSV file, so they can be easily processed.

Field names are not recorded to the file.

Record format:

```
date,msgId,from,to,disposition
```

Record example:

```
Fri Dec 26 15:26:16 NOVT 2014,null,A006,A005,RECEIVED
```

Field	Description
date	Date and time of the message
msgId	Message identifier. Is present only in message/cpim messages if isImdnRequired=true (see Web Call Server - Call Flow documentation, parameters of the passed messages in thesendMessagemethod are described there).
from	SIP from
to	SIP to
disposition	Message result:*RECEIVED, SENT, FAILED*. *RECEIVED*- the message is received. *SENT*- the message is sent. *FAILED*- there were an error while sending the message.

You can also gather any message statistics and their statuses you need using WCS REST API. See Web Call Server - Call Flow documentation that describes all methods and data sets that WCS sends via REST when it processes messages.

SDR logs

Stream Detail Record is a stream publishing and playing session logs.

SDR records are written to thesdr.logfile located atlogs/cdr. A new log file is created every 24 hours. Data are recorded as a CSV file, so they can be easily processed.

Field names are not recorded to the file.

Record format:

```
start;mediaProvider;name;mediaSessionId;duration;disposition;info;type;subscribers;
```

Record example:

```
2015-11-11 08:36:13;Flash;stream-Bob;5c2d75c0-7d87-421d-aa93-2732c48d8eaa;00:00:48;UNPUBLISHED;;PUBLISH;3;
```

Field	Description
start	Date and time the session started
mediaProvider	The media used in WCS JavaScript API:WebRTC, Flash

name	Name of the published / played stream
mediaSessionId	Media session identifier
duration	Duration of the session
disposition	Session result:*UNPUBLISHED, STOPPED, FAILED* *UNPUBLISHED*- publishing of the stream was stopped *STOPPED*- playing of the stream was stopped *FAILED*- incorrect session end
info	If disposition==*FAILED*, this field contains the description of the reason
type	*PUBLISH*if publishing the stream *SUBSCRIBE*if playing the stream
subscribers	The number of subscribers in case of publishing the stream; 0 if playing the stream

CONNDR logs

Connection Detail Record is a WebSocket sessions log.

CONNDR records are written to thesdr.loglog file located atlogs/cdr. A new log file is created every 24 hours. Data are recorded as a CSV file, so they can be easily processed.

Field names are not recorded to the file.

Record format:

```
start;mediaSessionId;disposition;info;duration;
```

Record example:

```
2018-04-25 19:29:08;/5.44.168.45:52199/95.191.131.64:8443;DISCONNECTED;Normal disconnect;17;
```

Field	Description
start	Date and time the session started
mediaSessionId	Media session identifier
disposition	Session result:*DISCONNECTED, FAILED* *DISCONNECTED*- the session ended by client's initiative *FAILED*- incorrect session end
info	Contains information about the session end
duration	Duration of the session

GC logs

By default garbage collector log files are located in /usr/local/FlashphonerWebCallServer/logs directory.

```
logs
---- gc-core-2018-12-18_20-02.log
---- gc-core-2018-12-18_19-56.log
```

The location and prefix of the log files can be configured inwcs-core.propertiesfile.

To enable log rotation by the JVM, the following options can be added to wcs-core.properties:

```
-XX:+UseGCLogFileRotation
-XX:NumberOfGCLogFiles=10
-XX:GCLogFileSize=2M
```

Then the log files will have names like

```
logs
---- gc-core.log2018-12-14_18-57.log.0
---- gc-core.log2018-12-14_18-57.log.1
---- gc-core.log2018-12-14_18-57.log.2
---- gc-core.log2018-12-14_18-57.log.3
---- gc-core.log2018-12-14_18-57.log.4.current
```

File with suffix 'current' is the file currently being recorded.

To remove creation time from log file names, remove date from variable GC_SUFFIX in bin/setenv.sh:

```
GC_SUFFIX=".log"
```

Then the log files will have names like

```
logs
---- gc-core.log.0
---- gc-core.log.1
---- gc-core.log.2.current
```

Mediasessions statistics logs

Since build5.2.1883 a current mediasessions statistics may be collected. The statistics may be logged to save it to a file when mediasession is closed. Also, since build 5.2.1975 the parameter is used to enable this feature

```
media_session_connection_stats_log=true
```

The mediasessions statistics is logged to the `/usr/local/FlashphonerWebCallServer/logs/stats/media-session-connection-stats.log` file in CSV form

```
#{mediaSessionId}; {channels_not_writable}; {decodable_drops_old}; {incomplete_drops_old};
{decodable_drops_reset}; {incomplete_drops_reset}; {decodable_drops_pli}; {incomplete_drops_pli};
{data_packets_with_empty_payload}; {missed_h264_units}; {dropped_audio_data_packets}
```

Where

- mediaSessionId - mediasession id
- channels_not_writable -TCP channels not writable events count
- decodable_drops_old - H264 decodable frames dropped count
- incomplete_drops_old - H264 incomplete frames dropped count
- decodable_drops_reset - H264 decodable frames dropped before a new decoding point count
- incomplete_drops_reset - H264 incomplete frames dropped before a new decoding point count
- decodable_drops_pli - H264 decodable frames dropped on PLI receiving count
- incomplete_drops_pli - H264 incomplete frames dropped on PLI receiving count
- data_packets_with_empty_payload - data packets with empty payload sent to test a channel quality when TWCC is enabled count
- missed_h264_units - missed H264 units count, per mediasession
- dropped_audio_data_packets - audio packets dropped before passing them to server engine

The record example

```
f49f8cb0-dc52-11ee-81df-51ad589334c0; 0; 0; 7; 0; 0; 0; 10; 0; 443; 0
```

The statistics logging should be set up in `log4j.properties` file as follows

```
log4j.logger.MediaSessionConnectionStats=error, mediaSessionConnectionStatsAppender
log4j.additivity.MediaSessionConnectionStats=false
log4j.appender.mediaSessionConnectionStatsAppender=com.flashphoner.common.logging.NewLogForEachRunFileAppender
log4j.appender.mediaSessionConnectionStatsAppender.DatePattern='.'yyyy-MM-dd-HH
log4j.appender.mediaSessionConnectionStatsAppender.layout=org.apache.log4j.PatternLayout
log4j.appender.mediaSessionConnectionStatsAppender.layout.ConversionPattern=%m%n
log4j.appender.mediaSessionConnectionStatsAppender.File=${com.flashphoner.fms.AppHome}/logs/stats/media-session-
connection-stats.log
```

If mediasession statistics logging is enabled, but there are no corresponding settings in `log4j.properties` file, the statistics will be logged to server log at ERROR level:

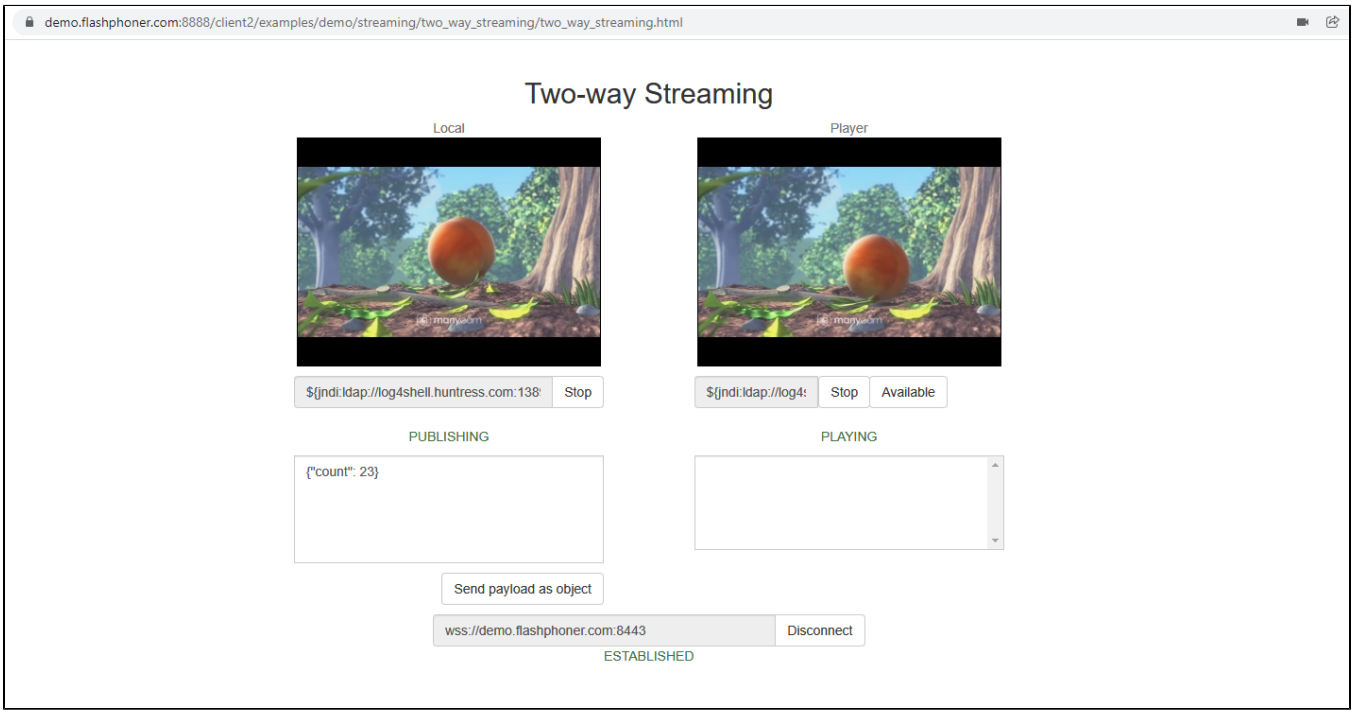
```
ERROR ssionConnectionStats - API-ASYNC-pool-7-thread-3 359943b0-fc64-11ee-bd5a-1dcbd3939090; 0; 0; 0; 0; 0; 0;
0; 40; 0; 0
```

CVE-2021-44228 vulnerability

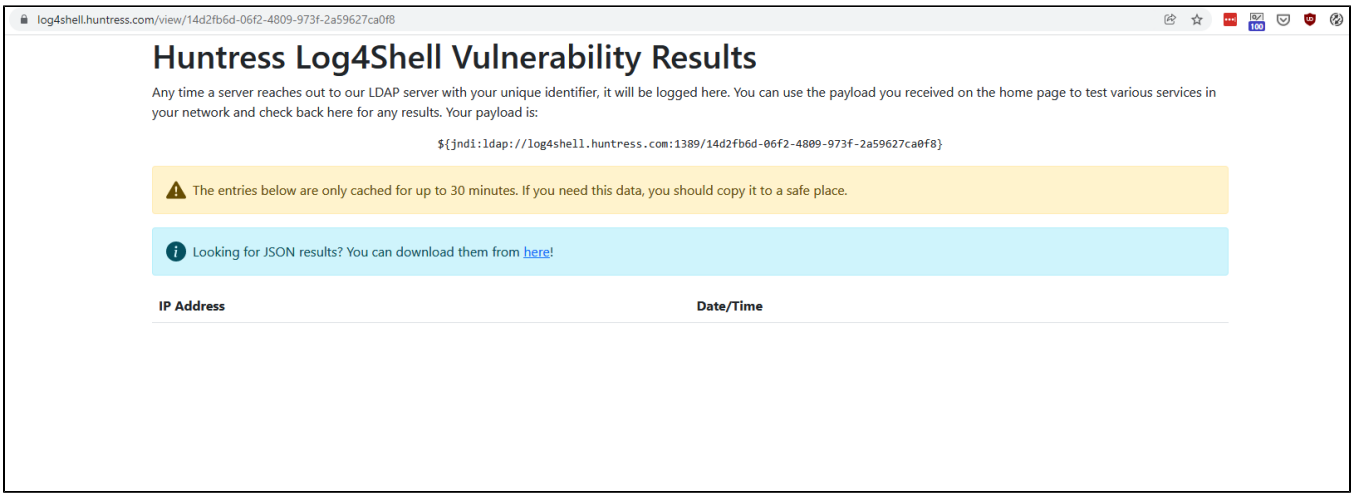
CVE-2021-44228 vulnerability in Apache log4j library cannot be exploited on WCS server. The logger can be configured via log4j.properties only, so attacker must have access to server file system. The vulnerability cannot be exploited via input fields etc. Let's check:

1. Use the URL https://log4shell.huntress.com/ to check the server. This page will generate an unique link to insert to a web page input fields

2, Open Two Way Streaming example page on demo server https://demo.flashphoner.com:8888/client2/examples/demo/streaming/two_way_streaming/two_way_streaming.html, click `Connect` and insert the test link to stream name fields. Publish and play a stream:



3. Open a special link to view test results. If vulnerability is exploited, `IP address` and `Date/Time` columns will show connections from tested server



As test shows, the CVE-2021-44228 vulnerability cannot be exploited in latest WCS build 5.2.1109

Under the hoods: why WCS is not vulnerable

WCS uses Apache log4j 1.2.17. This old version does not support JDNI feature which is added since log4j 2.0-beta9. Therefore, CVE-2021-44228 vulnerability cannot be exploited in WCS.