

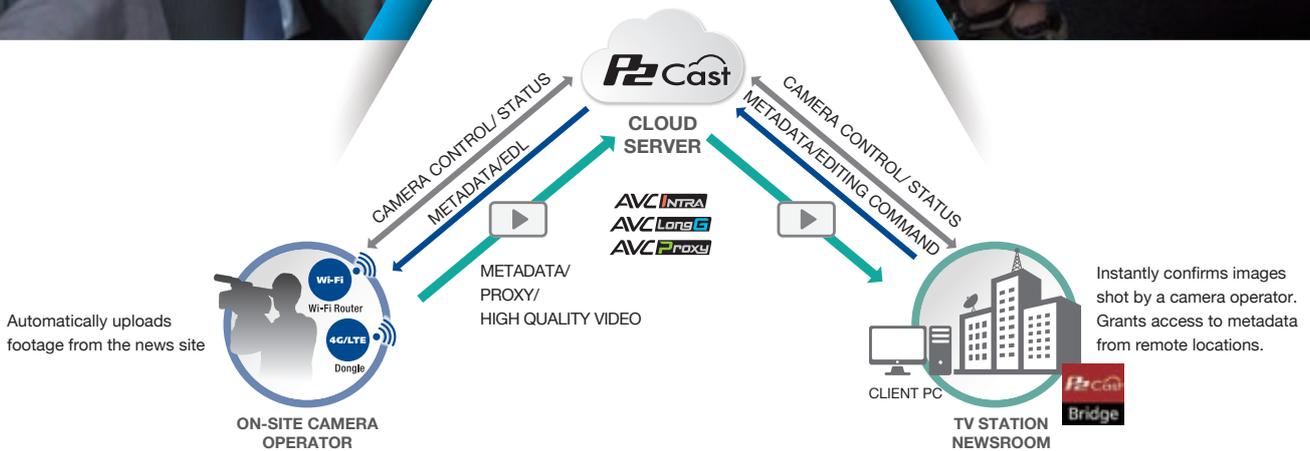
Panasonic

P2 Cast
P2 Workflow Solution

SPEED TO AIR

A revolutionary solution to news operations achieved by
P2 camera recorders and IoT technology

P2 Cast



Direct connection between the on-site news acquisition and the newsroom changes the production workflow. An IoT solution for news gathering that goes beyond the cloud.

P2 Cast is Panasonic's P2 central management system that brings a revolutionary solution to news gathering and operations. P2 Cast is far more than just a network-based data transfer or file sharing service. It automates the uploading of live images from camera recorders to the P2 Cast Cloud in real time. The newsroom editor and other staff members can share the image source on the web by accessing the cloud. What's more, P2 Cast makes it possible to obtain high-res (high-definition image) data using the Highlight Editing function, confirm the camera recorder information including position information, transmit metadata to the camera recorders, and centrally manage the camera recorders by remote setup. All these add up to a workflow revolution and innovation. P2 Cast offers a complete package of solutions that are required for today's news gathering and production — such as speed, low cost, high quality, management, and more.



SPEED

Near live broadcasting

The P2 camera recorders upload proxy (low bitrate) clips to the P2 Cast Cloud automatically and sequentially while shooting and recording. The newsroom editor and other staff members connected to the P2 Cast Cloud can access the clips immediately for near live news reporting. Live feeds are also possible with the P2SS (P2 Streaming Server). Furthermore, the P2 Cast Mobile app available from Panasonic enables the uploading of videos from smartphones. P2 Cast allows flexible news production using a greater range of news footage.

HIGH QUALITY

High-quality HD news image sources

Proxy clips have a low bitrate suitable for transmission and previewing. In addition, they offer a high-resolution HD mode so that captured images can be used directly for the delivery of breaking news. Using the Highlight Editing function, newsroom staff can perform cutting and editing work, and also remotely operate the camera recorders to obtain high-res data of only the necessary scenes, thus accelerating the workflow. This achieves speedy news production using high-quality images.

EASY SHOOTING

Automated operation allows the crew to focus on image acquisition

There is no special operation to be performed by the news gathering crew for using P2 Cast. The camera operator can shoot images in the

same way as before because the images are automatically uploaded, and metadata input, camera recorder management and control of cuts can be performed remotely in the newsroom. This allows the camera operator to concentrate on shooting, thus resulting in higher-quality news images. It also improves reliability because there is a backup of image data on the cloud. P2 Cast expands the scope of single-person news gathering to a great extent.

MANAGEMENT

Central management of camera recorders

News gathering camera recorders can be managed centrally via P2 Cast. There is no limit to the number of camera recorders that can be registered. In the newsroom, images captured by multiple camera recorders can be previewed, and clip metadata (program name, reporter name, reporting data/time, reporting site information, etc.) can be transmitted to the individual camera recorders for registration. In addition, the camera recorder locations can be displayed on a map based on GPS information. P2 Cast enables camera recorder setting and firmware updating all at once via the cloud.

LOW COST

Contributes to the reduction of total cost

Since P2 Cast uses an ordinary communication line, it enables live broadcasting and file transfer from a site where an OB van or helicopter cannot be dispatched. This also helps to lower communication expenses. In the newsroom, P2 Cast links to the existing NLE and news systems to eliminate extra processes and expedite program production. Use of the P2 Cast Cloud reduces both equipment and operations and contributes to a reduction of overall cost for the broadcasting operation.

Automated uploading of camera recorder images to the cloud in



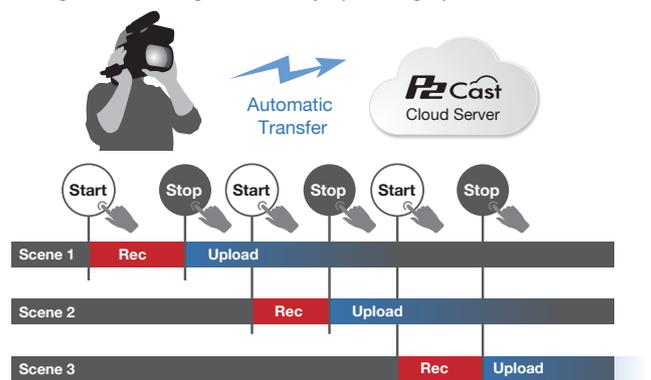
01 High-res clips and proxy clips

The P2 camera recorders/portable recorders are equipped with a dual codec recording function that simultaneously records images in two clips. The main high-res (high image quality) clip is recorded by an AVC-Intra or AVC-LongG codec, and the sub-clip is a proxy clip with a low data rate. Either the main clip or sub-clip can be selected according to the required image quality and data rate.

	Codec	Resolution	Bit Rate
Main	AVC INTRA	AVC-Intra200	FHD 10 bit 4:2:2 200 Mbps
		AVC-Intra100	FHD 10 bit 4:2:2 100 Mbps
		AVC-Intra50	HD 10 bit 4:2:0 50 Mbps
	AVC LongG	AVC-LongG50	FHD 10 bit 4:2:2 50 Mbps
		AVC-LongG25	FHD 10 bit 4:2:2 25 Mbps
		AVC-LongG12	HD 8 bit 4:2:0 12 Mbps
Sub	AVC-G6	FHD 8 bit 4:2:0 6 Mbps	
	AVC PROXY	SHQ	960 x 540 3.5 Mbps
	HQ	640 x 360 1.5 Mbps	
	LOW	320 x 240 0.8 Mbps	

02 Stream uploading of shot images

P2 Cast enabled P2 camera recorders/portable recorders are provided with a function to upload video while it is being recorded locally. This function automatically uploads clips and data in the background. The clips/data can also be stored in a memory card or played back while the data is transferred. In the event the network connection or power is cut off during the data transfer, the transfer operation resumes immediately after the network connection or power is restored. This allows the camera operators to concentrate on shooting without being bothered by uploading operations.





P2 Cast Cloud Server



- 05 Sharing of proxy clips on P2 Cast Cloud
- 06 Highlight Editing and high-res clip transfer
- 07 Monitoring of camera recorder status and position information
- 08 Remote metadata editing
- 09 Remote camera recorder setting

Streaming

FTP

Newsroom System at the Station



10 P2 Streaming Server (P2SS)
QoS Live Streaming Solution



AJ-SRK001

Streaming Receiver Server KIT (Software Key)
(The red front panel is only available in some areas)



LU2000

LiveU Server

(Not supported on P2 Cast but LiveU Central Cloud System only)

11 P2 Cast Bridge

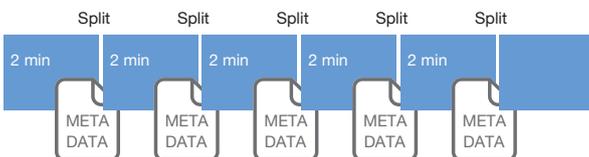
- Highlight Editing
Adobe Premiere Pro
- Highlight Editing
Avid Media Composer
- Metadata workflow
Avid iNEWS
- Automatic ingestion
Avid Interplay

03 Near live uploading

There are two data uploading modes. In one mode, recorded clips are automatically transferred. The other is a mode that can be used for near live broadcasting. In the near live mode, image data is split into 2 minute files, and those proxy video data files are automatically and sequentially uploaded to the P2 Cast Cloud. The files can be previewed on a WWW browser. After the shooting/recording is finished, the data is merged into one clip on the P2 Cast Cloud.



Sequential Transfer

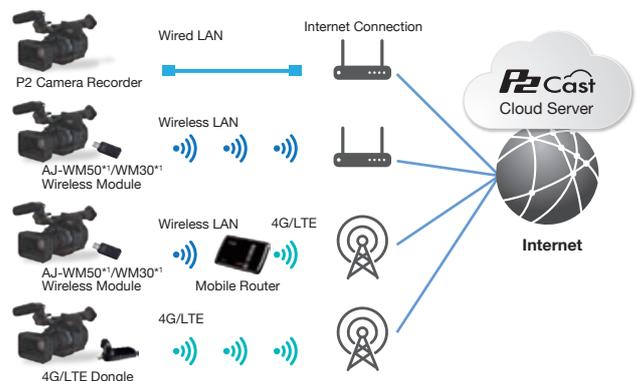


04 Convenient single dongle, flexible network connection

The P2 camera recorders are designed to accommodate either the AJ-WM50*1/WM30*1 wireless module or 4G/LTE modem*2 inside the main unit. Since there is no need for an external transmission device for connection to a network, nimble news gathering is possible. The P2 camera recorders also have wired LAN connectivity and bonding connectivity. So, the most suitable connection method can be selected according to the available network environment.

*1: Not available in some areas.

*2: For details, refer to "Notes Regarding Network Functions" on the back page.



Sharing and editing of video by multiple staff members as well as

Menu Bar

The tab lets you switch the screen's functions, such as the home screen and user list screen.

Shot List

Lists shots uploaded automatically from a P2 camcorder. Select by clicking or tapping to preview or edit highlights.

Shot List Menu

An operating button that indicates how many shots are displayed and enables searching and downloading.



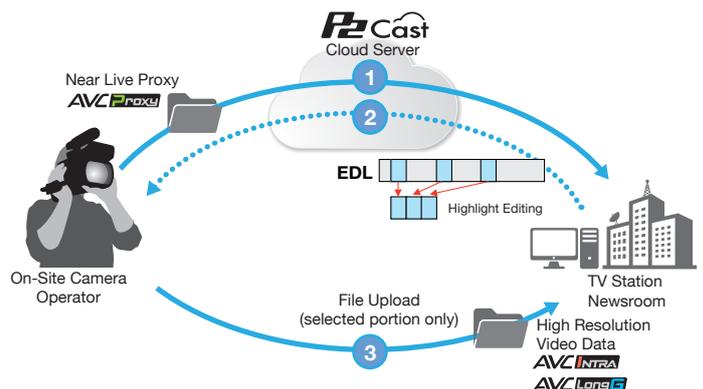
05 Sharing of proxy clips on P2 Cast Cloud

Proxy video data/clips uploaded on the P2 Cast Cloud can be shared by a number of staff members. They can also be accessed from anywhere using a WWW browser on a notebook PC or tablet. There is no limit to the number of users that can be registered. The authority to access individual functions, such as previews, downloading, deletion and metadata registration, can be set for each member. The levels of access authority can be managed in groups.



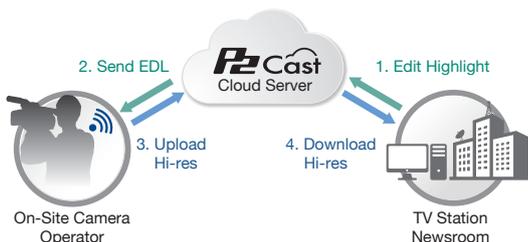
06 Highlight Editing and high-res clip transfer

Using the P2 Cast WWW browser, proxy video being recorded by a news gathering camera recorder can be previewed and EDL data containing IN/OUT points can be created. By sending the EDL to the P2 camera recorder/portable recorder, specified cuts can be made from the main high-res clip and transferred. This data can be uploaded to the P2 Cast Cloud or to a specified server by means of FTP. The Highlight Editing function dramatically reduces the time it takes for previewing, editing and obtaining high-res news image sources.



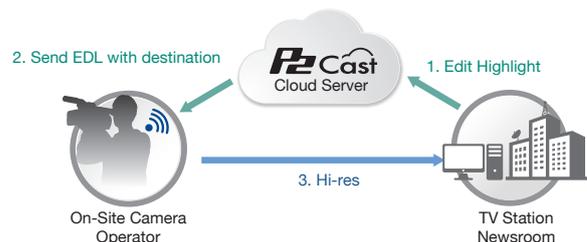
Option A

Upload and download via the P2 Cast cloud server.



Option B

Directly transfer files with FTP to the client's computer or to another server.



Login/Logout Button
This screen is displayed when you login with your registered user account.

Search Pane
Refines your search shot images. The shots narrowed down by "creation date/media/group/registered user" will be displayed on the shot list shown on the left.

Preview and Highlight Editing
Play shots selected in the shot list, complete highlight editing, and add prepared subshots to the item box.

Create Playlists
Save and edit playlists combining your added subshots. Download high-resolution data from the P2 device.

Example of P2 Cast web browser

07 Monitoring of camera recorder status and position information*

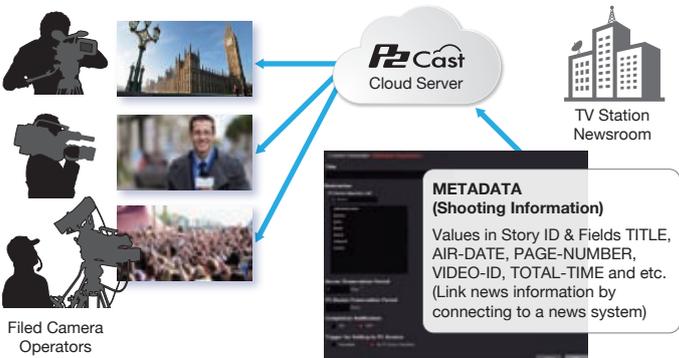
The P2 Cast WWW browser displays the P2 camera recorder/portable-recorder status (network connection, thumbnails, camera operator, recording condition, media mounting condition, battery power level) for easy confirmation. Using the GPS function* of the camera recorders, the camera recorder locations can be displayed on a map. This allows accurate positioning of the crew members for efficient news gathering.

*When using P2 camera recorders equipped with the GPS function (AJ-PX5000G, AJ-PX270)



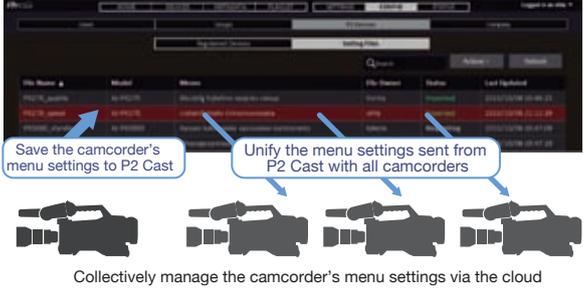
08 Remote metadata editing

Clip metadata (program name, reporter name, reporting date/time, reporting site information, etc.) can be edited using the P2 Cast WWW browser and remotely registered in the video clip recorded by the camera recorder. Creating and managing all metadata in the newsroom ensures higher reliability than when using conventional SD memory cards, and also allows quicker response to changes made immediately before acquisition. News information can also be recorded as metadata when linked with the news system.



09 Remote camera recorder setting

The menu setting of the P2 camera recorder/portable recorder can be remotely operated by using the P2 Cast WWW browser. The firmware of the P2 camera recorders/portable recorders can also be updated via P2 Cast. This allows efficient management of many P2 camera recorder/recorder units without omission.



Systems and partners that expand P2 Cast applications



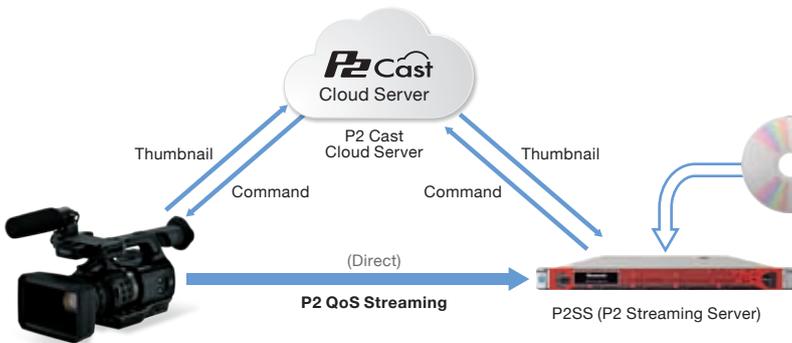
10 P2SS (P2 Streaming Server): Full-HD streaming delivery

The P2 camera recorders can transmit Full-HD streaming video while shooting and recording. The original QoS (Quality of Service) mode optimizes the bitrate according to the condition of the communication line so that stable streaming distribution can be maintained even when the communication band narrows.

A server installed with the P2 Streaming Server software (for Windows; Mac not supported) is used as the receiver server. The GUI is designed for intuitive operation, and a variety of input and output terminals are provided for added versatility. Although the P2SS can be used as a dedicated system for streaming distribution, combining it with P2 Cast provides greater benefits in equipment operation, such as IP connection setting and camera recorder management.



Example of P2 Streaming Server



AJ-SRK001
Streaming Receiver Server KIT
(Software Key)

- Stable streaming by original QoS technology
- Manage 1000 cameras monitoring 20 cameras/page
- Max 4 simultaneous streaming outputs

* P2SS is a software product (AJ-SRK001 Streaming Receiver Server KIT) that is installed onto the server. The customer must provide their own server.
*The red front panel is only available in some areas.

11 P2 Cast Bridge: Direct connection to the newsroom

P2 Cast Bridge is plug-in software that directly connects P2 Cast to nonlinear editor, News Automation, and Media Asset Management systems. This makes it possible for nonlinear editors to directly access and edit proxy video data on the P2 Cast Cloud. By connecting the News Automation and Media Asset Management systems to P2 Cast, the link with video footage and equipment is further enhanced without having to change the station's existing workflow.

Panasonic also supplies each partner company with a P2 Cast Web API (SDK) for smooth development of supporting P2 Cast cloud. This supports P2 Cast for more systems and more users.



Example of Adobe Premiere Pro (+ P2 Cast Bridge)

P2 Cast Bridge development completed (beta version)



Example of Avid Media Composer (+ P2 Cast Bridge)

*P2 Cast Bridge for iNEWS is beta version released.

*P2 Cast Bridges for Premiere Pro, Media Composer and Interplay are scheduled for release in spring 2018.



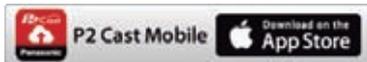
12 P2 Cast Mobile: Connection of smartphone cameras to P2 Cast/P2SS

P2 Cast Mobile is an app that allows the use of videos recorded by smartphones as news footage. If an unexpected event occurs, a smartphone can be used to quickly capture the scene for use as a news image source. While the smartphone is capturing the image, P2 Cast Mobile uploads the image data to P2 Cast or transmits streaming data to the P2SS. It also supports P2 Cast Highlight Editing and metadata editing. Clips recorded by the app can be saved on the iPhone's camera roll.

*See the following App Store for information on the P2 Cast Mobile operating environment.
<https://itunes.apple.com/us/app/p2-cast-mobile/id1180486803?ls=1&mt=8>



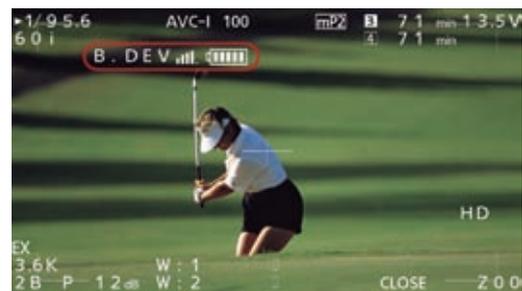
- App Store is a registered service mark of Apple Inc.
- iPhone is a registered trademark of Apple Inc. in the U.S. and other countries.



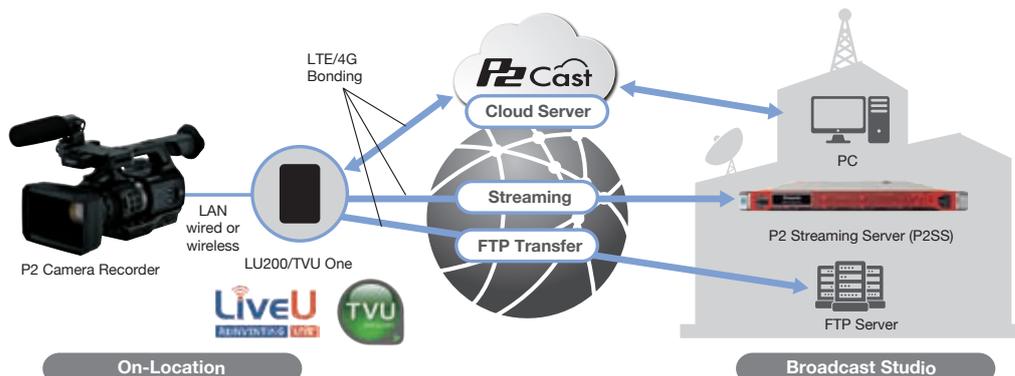
*Picture simulated.

13 LiveU, TVU: Compatibility with bonding connection services

Panasonic has established specifications in partnership with LiveU and TVU Networks. By combining the devices offered by the two companies with a news gathering camera recorder, data can be transmitted concurrently over multiple lines (bonding). This achieves more stable live streaming of high-quality image data to the P2SS. It also improves the transfer speed and stability when uploading proxy clip files or Highlight files to P2 Cast. In addition, the LiveU/TVU device status is displayed in the camera's viewfinder for real-time confirmation of the network connection condition.



Example of the viewfinder display in the bonding connection state



*The red front panel is only available in some areas.

Users Report

"P2 Cast is a big game changer for us."

US COX MEDIA GROUP – P2 Cast

The US COX MEDIA GROUP introduced P2 Cast to speed up the news cycle in an industry that is changing at a very fast rate. A total of 30 P2 camera recorders are connected to P2 Cast. The proxy video is instantly uploaded for previewing and the program editing proceeds. It is also fed as is to SNS or news flashes. But they're sending more than just video footage, they're also sending information to the web team about where the camera operator is shooting and what kind of job it is without having to interrupt what's going on in the field. This makes it a very effective management tool.

"The images can be sent to the editing system while they're being shot. These images are available much sooner to both the people in the field and the people in the studio than ever before." said Dave Sirak, Director of News Technology.

"We use P2 Cast everyday, it's a flexible tool. What it really does is it refines the workflow." said Brian Smith, Director of News Technology.

"We don't have to set up a truck, we don't need to set up a bunch of connections. We can just send that video back while I'm still shooting." said Chris Romero, Promotion Manager.

"It used to take us 20 minutes to get a truck set up. Now we can do it in 2 to 3 minutes. The team sits there on a computer and grabs whatever they want whenever they want it, without having to interrupt what's happening in the field. And for the camera operators, P2 Cast is no interference at all. There are no special settings or operations, and the clips are automatically uploaded." said Dave Ater, News Operations Manager.

WFTV has already gained major value from introducing P2 Cast, but we're anticipating that this system will be even more essential as our industry and technology changes in the future.



Images captured on location are viewed at the station.



"This system is overwhelmingly faster for reporting flash news and accidents."

TBS Television, Inc. – P2 Cast and P2SS

As part of the revamping of its news workflow, TBS TV has introduced P2 Cast and a P2 Streaming Server. Images captured by multiple AJ-PX5000G and AJ-PX270 memory card camera recorders are simultaneously sent to the station via an LTE circuit, the images are streamed in real-time.

At the station, thumbnails of up to 20 camera images can be displayed per screen (input from a maximum of 1,000 cameras is possible).

"During a recent typhoon in Japan, our nearest local staff member was able to get to the location quickly. This showed the true strength of P2SS, with its ability to handle live feeds only using a camera with a single modem mounted." said Hajime Ashikari, Manager, News Operation & Engineering.

"The P2 Streaming Server doesn't even require a dedicated device. Control is possible from tablets and notebook computers on each floor of the building, for a more flexible response." said Yoshikazu Katori, Network Operations, Division of TV Technology (at the time of interview).

"In contrast with other live feed devices, the mounting of a dongle is all that is necessary to connect the device P2SS, so live feeds are possible using the same equipment that you customarily use for ENG. This adds to the P2SS mobility, and makes it even more valuable." said Yu Matsuno, Camera Operator, News Operation & Engineering.

"When a camera man suddenly needs to go to the shooting site, they normally bring only a camera and shoot. However, they can feed live-streaming without any time losses as they are shooting. When viewed from the viewpoint of the first responders, this is overwhelmingly speedy. When an accident or malfunction occurs within the scope of the news, it can be sent to air as is, and since it was captured by multiple cameras, it can be used as a major weapon," said Yoshihisa Yamamoto, Deputy Director of the Department of News Engineering & Operation.

P2 Cast and P2 Streaming Server are expected to bring major innovations to the field of news production.



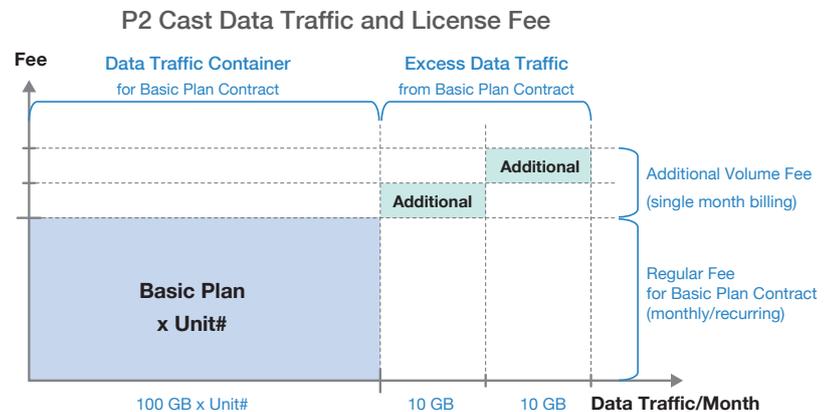
P2 Cast Fee Structure

As of March, 2018

To use P2 Cast, there is a monthly license fee (basic plan: data volume of 100 GB/license). If the specified data volume is exceeded, there will be an additional charge for the excess portion of the data volume in units of 10 GB.

P2 Cast Basic Plan
(AJ-CBD001, up to 100 GB)

Additional Fee for the Excess Portion of Data Volume
(AJ-CBD002, for each 10 GB of the excess portion)



The following are included in each P2 Cast license

- Basic functions of the P2 Cast Cloud app (no limit to the number of terminal devices or the number of members)
- Temporary video data storage area on P2 Cast Cloud (proxy video data stored for a period of two weeks, high-res video data stored for a period of two days)
- User group access management and content management (User's administrator can register new members and make authority settings.)

The following are not included in the P2 Cast usage fee

- Communication devices (4G/LTE dongle, Wi-Fi adaptor, mobile router, etc.)
- Communication cost (4G/LTE and others)

Determination of P2 Cast data volume

- Data volume is determined based on the amount of data transferred inside the P2 Cast system. (upload/transfer/download/playback on cloud)
- The total data volume (100 GB x number of licenses) can be shared within the user company.
- There is no limit to the number of connected camera recorders or the number of members.
- If the specified data volume is exceeded, an additional fee for the excess portion of data volume is charged in the following month.

P2 Cast Mobile option

P2 Cast Mobile (AJ-CBDM10/up to 10 iPhones (Up to 10 AJ-CBDM10/iPhone units))

This software enables the use of iPhones (up to 10 per license) as a camera, and allows near live transfer or video file transfer to P2 Cast; QoS live streaming to a P2SS; and monitoring of the camera status (including GPS) and editing of metadata.

Compatible Operating Environments of P2 Cast

See the following Panasonic web site for information on the P2 Cast operating environment.

<https://pro-av.panasonic.net/en/p2cast/index.html>

Please refer to the latest Non-linear Compatibility Information, P2 Support, Download and Service Information, etc. at the following Panasonic web site.



<https://pro-av.panasonic.net/>

*** Notes regarding the handling of p2 files using a PC**
Mounting and Transferring Files

The PC must be installed with the included P2 driver in order to recognize, copy and transfer P2 files. This driver is also necessary when using the PC card slot and when handling P2 files stored on a hard-disk device, such as P2 store. For other operating requirements, refer to the P2 installation manual. The P2 driver and the P2 installation manual can be downloaded free from a Panasonic website. Visit <<https://pro-av.panasonic.net/en/download/>>

Preview and Nonlinear Editing

To preview (play) P2 files on a PC, it is necessary to install P2 Viewer Plus software (downloadable for free, for Windows and Mac), both from Panasonic, or P2-compatible editing software available from other companies (for details, visit <https://pro-av.panasonic.net/en/sales_o/p2/partners.html>). Note that each software places specific requirements on the operating environment, and the operating environment must meet additional requirements to play and edit HD content on Windows PCs and Macs. For P2 Viewer Plus download and operating requirement information, visit <<https://pro-av.panasonic.net/en/download/>>. For operating requirements and details of other P2 editing software, visit the website of the relevant software manufacturer.

**** Notes Regarding Network Functions**

•**For 4G/LTE connection:** 4G/LTE module is required from a 3rd party. Availability of this function may vary depends on areas. For details, please visit Panasonic website <https://pro-av.panasonic.net/en/sales_o/p2/server/4glte.html>.

•**For wireless LAN connection:** Wireless module (optional, AJ-WM30 or AJ-WM50) is required. For the OS, browser, device compatibility information, see "Service and Support" on the Panasonic website <<https://pro-av.panasonic.net/>>. Some functions are not supported by some devices.

•**For iPad remote control:** The P2 ROP App (downloadable free of charge from the Apple App Store) is required. For details, please visit Panasonic website <https://pro-av.panasonic.net/en/sales_o/p2/ver_up/p2rop_app.html>.

•**For streaming:** Transfers only to a designated server (one server). The proxy image cannot be recorded while streaming. The streaming function cannot be used together with dual codec recording and simultaneous recording, or with the Rec during Uploading function. For details on downloading and the operating environment of video streaming compatible application software, see "Support & Download" on the Panasonic website <<http://pro-av.panasonic.net/>>. For streaming, 4G/LTE USB modem and PC must be able to access directly each other by Public IP (Global IP). Please contact your provider to get Public IP (Global IP). To display the streaming video using P2 browser, player is required (VLC MEDIA PLAYER for Windows PC, QuickTime Player for Mac). P2 Streaming Receiver software (Windows only, not supported by Mac; available free of charge) is required for receiving the QoS mode. Please visit Panasonic website <<https://pro-av.panasonic.net/en/download/>>.

•**For LiveU and TVU bonding services:** Connection requires communication devices offered by both LiveU and TVU Networks. For details, please visit the following website. <https://pro-av.panasonic.net/en/sales_o/p2/bonding_devices/index.html> (Connection Confirmed Bonding Devices)

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*Specifications are subject to change without notice.



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Brazil	+55 11 3889 4035	Malaysia	+60 3 7809 7888	Thailand	+662 731 8888
Canada	+1 905 624 5010	Mexico	+52 55 5488 1000	Turkey	+90 216 578 3700
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Greece	+30 210 96 92 300	Poland	+48 (22) 338 1100		
Hungary	+36 (1) 382 60 60	Portugal	+351 21 425 77 04		
India	+91 1860 425 1860	Romania, Albania, Bulgaria, Macedonia	+40 (0) 729 164 387		
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Jordan	+962 6 5859801	South Africa	+27 11 3131622		
Kazakhstan	+7 727 298 0891	Spain	+34 (93) 425 93 00		
Korea	+82 2 2106 6641				



Factories of AVC Networks Company have received ISO14001:2004-the Environmental Management System certification. (Except for 3rd party's peripherals.)