



COMMERCIAL VIDEO VS PUBLIC SAFETY VIDEO

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MOTOROLA SOLUTIONS



AGENDA



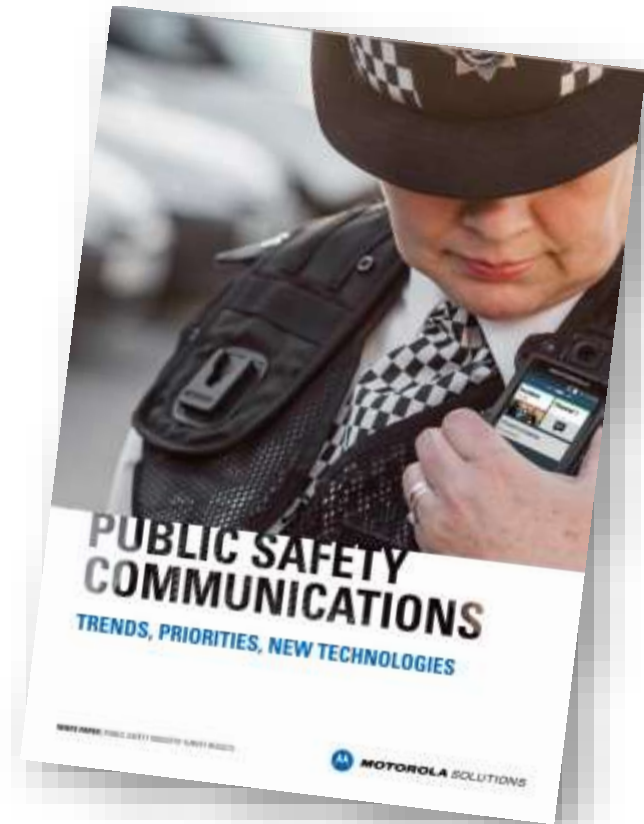
- **Motorola Solutions EMEA Public Safety Survey 2017**
- **Commercial video vs public Safety video**
- **Technical**
- **Definition of use cases**
- **Forensic analysis**
- **Fixed camera**
- **Body worn camera**
- **360dgr Camera**

MOTOROLA SOLUTIONS EMEA PUBLIC SAFETY SURVEY 2017



The survey was conducted earlier this year and reflects the input of almost 200 public safety professionals in 46 countries across EMEA.

https://www.motorolasolutions.com/content/dam/msi/docs/en-xu/public-safety/2017_emea_public_safety_survey_report.pdf





TRENDS, PRIORITIES, NEW TECHNOLOGIES

GROWTH IN VIDEO, ESPECIALLY BODY WORN



VIDEO USAGE

The recent survey shows consistent growth in the use of video across almost all types and substantial growth of 80% in responder-worn (body-worn) video (32% today vs 18% in 2015). In 2015 almost half (48%) of agencies used some form of video. That has risen to around two-thirds (67%) in 2017.

GROWTH IN USE OF VIDEO (2015 TO 2017)

80%



RESPONDER WORN

FIXED
20%



IN-VEHICLE

51%



19%

VIDEO ANALYTICS

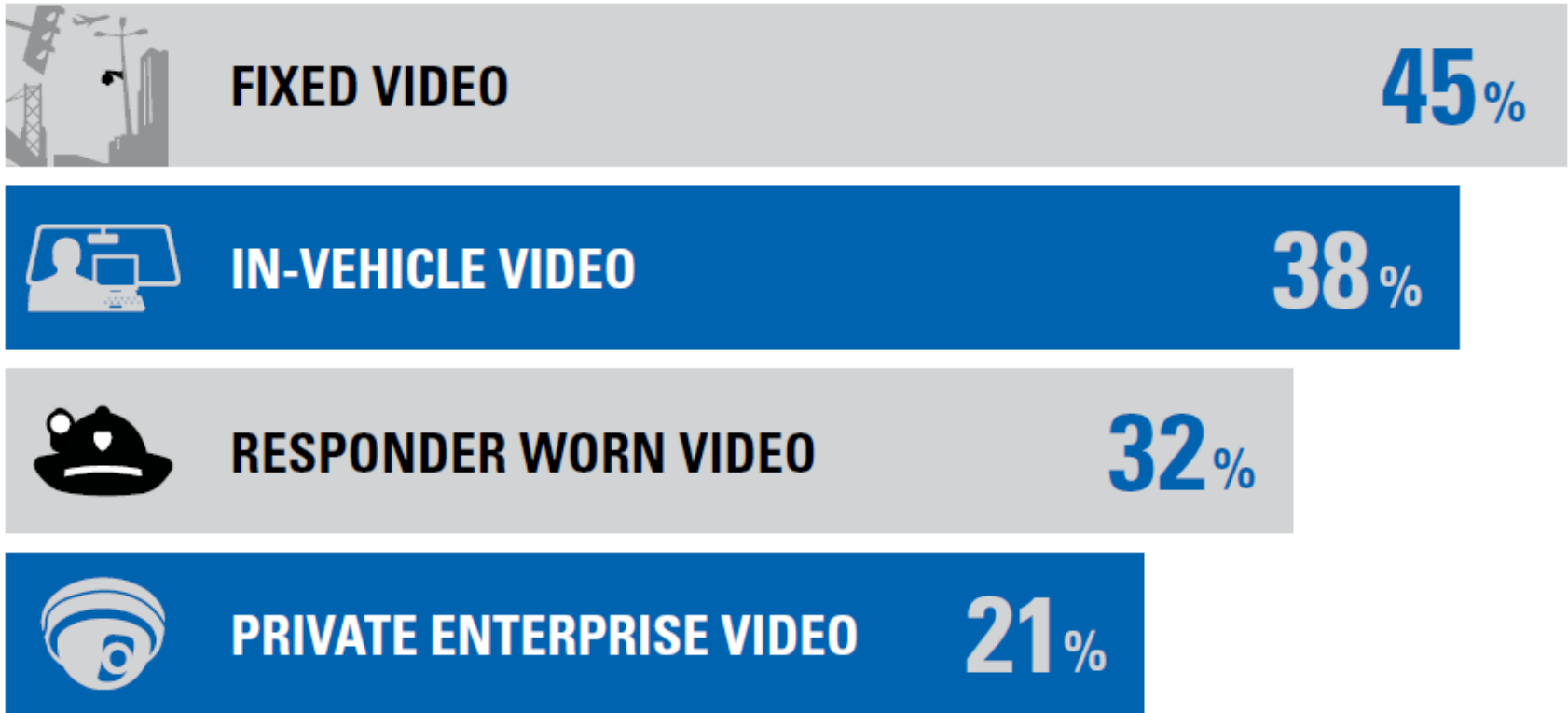


VIDEO USEAGE



Although we are seeing growth across the board and this exceptional growth in body-worn video, **fixed and in-vehicle video** are still the top video uses:

CURRENT USE OF VIDEO SOLUTIONS (2017)



BARRIERS TO VIDEO USEAGE



BARRIERS TO VIDEO USAGE

The main barrier to video adoption remains administrative overhead and cost with the same proportion of recipients (44%) quoting this as the biggest barrier, followed by concerns over privacy (25% to 23%)... However, we are now also seeing significant growth in concerns over security of data against tampering which has grown over 41% (13% to 18%)

CONCERNS OVER USE OF VIDEO (2017)

44% ADMINISTRATIVE
OVERHEAD AND COST



23% PERSONAL
PRIVACY



18% DATA
SECURITY



VIDEO AND THE CLOUD



VIDEO AND THE CLOUD

Video comes high on the list of applications that respondents want in the cloud. 48% of respondents want to have cloud-based video storage and 34% want video analytics there.

So where does the cloud fit in?



PUBLIC SAFETY IN THE CLOUD



CLOUD APPS IN USE TODAY

Cloud-based applications for Public Safety are a relatively new offering. We wanted to find out who is using them and identify key needs. Agencies are already using a wide rspread of cloud based applications. In fact, over one-third of respondents tell us they are already using cloud based reporting. What are the top 5?

PUBLIC SAFETY CLOUD APPLICATIONS IN USE TODAY (2017)

1

34%

REPORTING



2

29%

VIDEO DATA
STORAGE



3



26%

CRIME AND INCIDENT
DATA SHARING

PUBLIC SAFETY IN THE CLOUD



4

23% SOCIAL MEDIA ANALYSIS



5

23% REAL TIME MAPPING

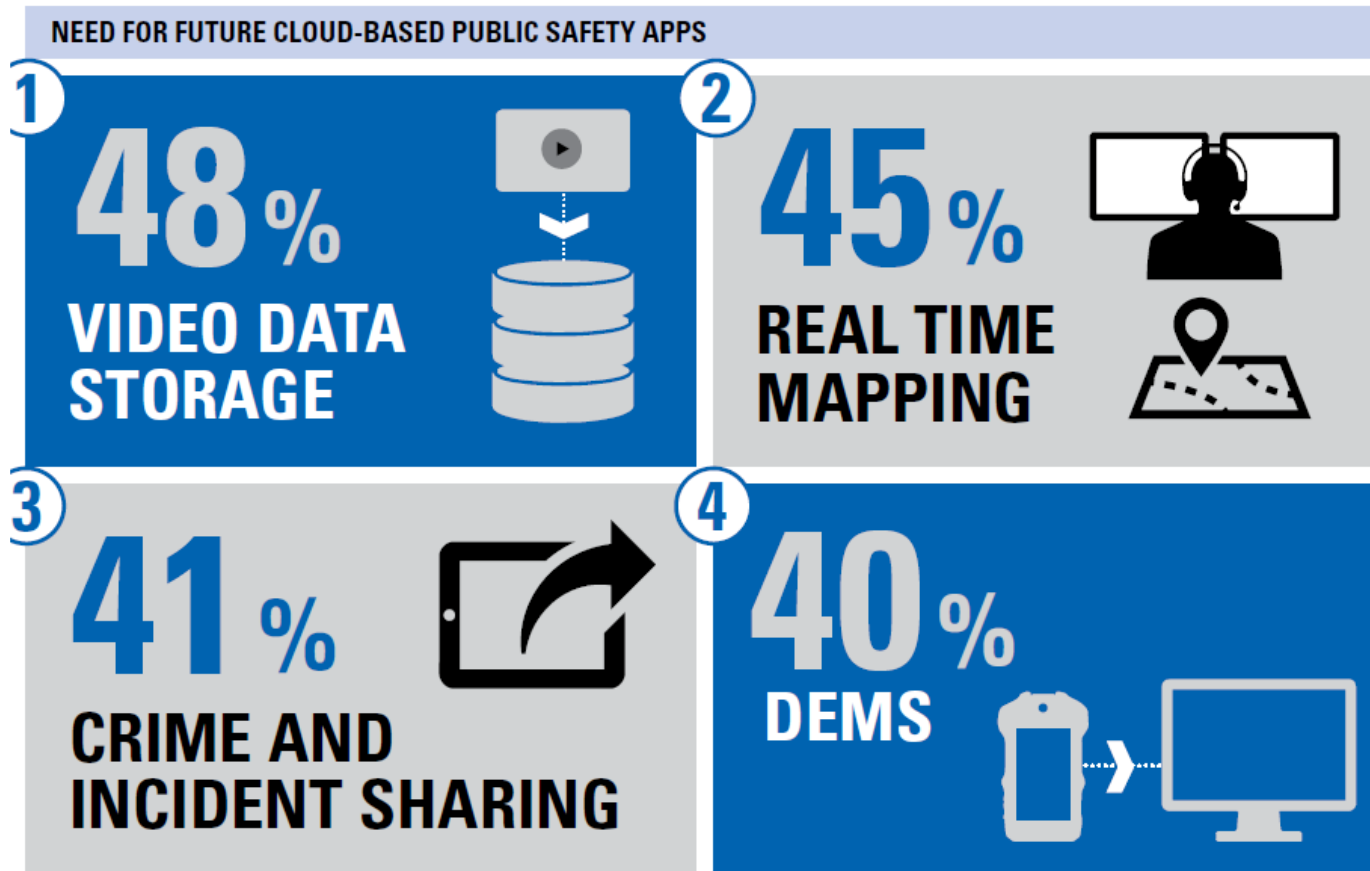


CAD (Computer Aided Dispatch) and ICCS (Integrated Communications Control Systems) don't feature strongly but do get a mention (19% and 16% respectively). At the moment bottom of the pile are crime prediction (14%) and voice logging (12%). The average figure for current useage across all 12 app types we surveyed is 20.5%.

CLOUD IN THE FUTURE



As well as finding out what cloud-based apps are in use today we asked what cloud-based apps our respondents wanted. We found that the picture of cloud-based apps that respondents want is slightly different to the one reflecting those already in use. Respondents want a wide range of apps but four key ones stand out and almost half of respondents mention video data storage. What are the top 4?



The average figure across all the 12 app types respondents wanted is 36.2% - (against 20.5% in use) – expressing a clear need for cloud-based apps – a potential for almost 76% growth.

BARRIERS TO CLOUD APPLICATION



There are some real barriers seen by our responders to the adoption of cloud. Almost two-thirds cite security concerns and over half are concerned about privacy/access and cost.

CONCERNS OVER PUBLIC SAFETY CLOUD ADOPTION



66%
SECURITY

55%

COST



52%



**PRIVACY AND
WHO CAN
ACCESS MY DATA**

TECHNOLOGY, MEDIA & TELECOM INDUSTRY REPORT



Video Analytics in Security and Business Intelligence Report – 2017

30 June 2017

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EXECUTIVE SUMMARY



- IHS Markit estimates the total paid video analytics market to have been worth **\$110.4** million in 2016 and forecasts it to grow at a compound annual growth rate (CAGR) of **17.3%** from 2016 to 2021 to reach **\$700** million in 2021.



DEEP LEARNING ANALYTICS



- Deep learning analytics are poised to revolutionise the industry, and facilitate a significant leap in the capabilities of video analytics.
- Within the existing field of video surveillance and analytics however, it represents **completely new approach**. Deep learning appears to be able to offer a level of accuracy and reliability in object and behaviour classification, that not only enables video analytics to finally deliver on some of the lofty but as yet unrealised claims made in the past, but pushes capabilities far beyond them.

SEARCHABLE VIDEO ANALYTICS



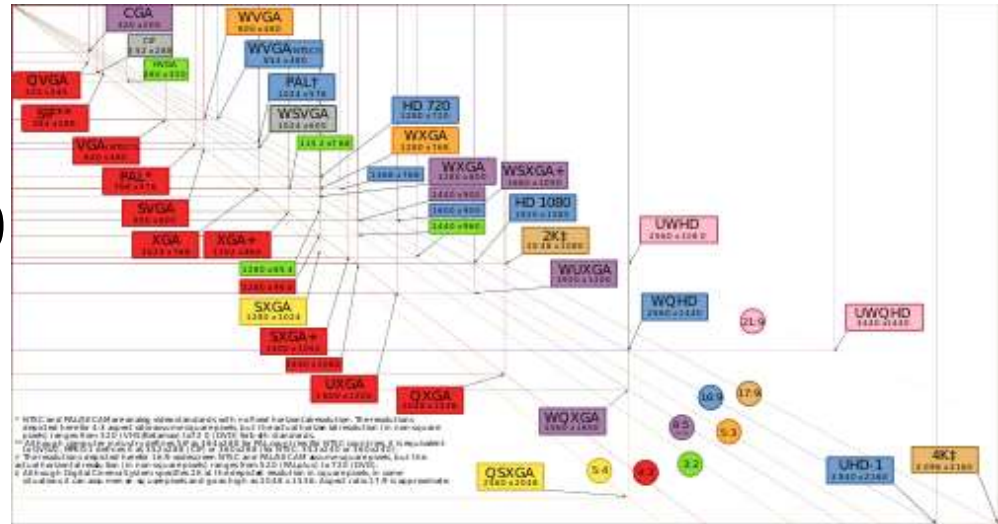
- The vast majority of video surveillance footage is not monitored.
- In the same way that search engines created mass appeal for the internet, searchable analytics from companies such as xx, yy, and zz are changing the way that stored video is searched, making it quicker, easier and more cost effective to find the correct frames.

COMMERCIAL VIDEO VS PUBLIC SAFETY VIDEO



In a perfect world you want to have the same native resolution from camera, during transport to monitor to archiving.

- SD – 640 x 480
- HD – 1280 x 720
- Full HD – 1920 x 1080
- 4K – 3840 x 2160
- 8K – 7680 x 4320.



- HD is a recording dimension, not an absolute indication of quality.



PUBLIC SAFETY VIDEO REQUIREMENTS



- **Observation**

- High-frame (re-fresh) rates

- **Review**

- Excellent coverage and a frame rate high enough to capture an event

- **Recognition**

- Require the highest resolution or amount of pixels.

RESOLUTION

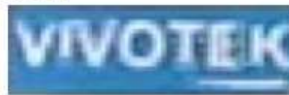


- **ppf** – a predictable level of quality
- **License plate Recognition**
 - 50/60ppf as a minimum
- **Facial recognition**
 - 80ppf as a minimum

40 PPF



60PPF



80PPF



120PPF



Original image



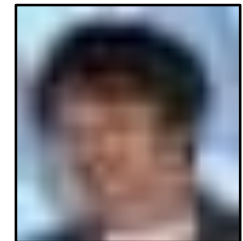
80ppF



60ppF



40ppF



20ppF



PARAMETERS IN USE CASES



- **When will the video material be needed**
- **What is the purpose of capturing the video?**
- **How much movement?**
- **How much spacial detail?**
- **Lighting conditions?
Daylight / inside / outside**



THE LIFE OF VIDEO



- **Lens Configuration**
- **Image Capture**
- **Processing**
- **Transport**
- **Storage**
- **Analytics**
- **Display**
- **Deletion**



In a perfect world you want to have the same native resolution from camera, during transport, to monitor, to archiving.

The world is not perfect.



VIDEO SURVEILLANCE TRADE-OFFS



Question of Balance:

Finding the right combination of image quality, frame rate and bandwidth.

Option	result/implication
Increase Bandwidth	Improves quality but increases cost
Reduce Resolution	Reduces cost but provides less detail
Reduce Frame Rate	Reduces cost but results in choppy motion
Use Digital Compression Techniques	Essential to all modern digital surveillance solutions to help balance quality and bandwidth needs.



response	advantages	Disadvantages
reduce image resolution	Although noticeable, there is a nearly proportional drop in required bandwidth.	Loss of picture detail. increased likelihood that some details will not be resolved. Face recognition or license plate reading may become impossible.
reduce frame rate	reduces bandwidth requirement without loss of picture detail.	Makes video more difficult to watch live, increasing fatigue. Modern compression means that payoff in bandwidth will probably be low. increased likelihood of missing something.
Use more aggressive compression	reduces required bandwidth, possibly by quite a bit.	reduces picture detail, particularly when action/motion is taking place. Transmission gaps can result in anomalies that look strange and damage the video's credibility in court.
Use more advanced compression (i.e. MPEG4, h.264)	reduces required bandwidth without sacrificing picture detail or video quality.	requires newer hardware and software that cost more money.
Add more bandwidth	Allows higher-quality video to be transmitted, permitting a higher frame rate, higher resolution, less aggressive compression, or a combination of all three.	Costs more money, and may be difficult in some areas.
Store video in the same location as the camera, in addition to transmitting the data elsewhere. (Digital Video recorder at the edge.)	Allows high-quality video to be retained, without deploying more bandwidth. Video can be retrieved if needed, e.g. for a court case.	Video has to be downloaded or physically retrieved before it's deleted or overwritten, or the equipment is damaged. This is costly and can create personnel safety concerns. Costs grow in proportion to the number of cameras.




FORENSIC VIDEO ANALYTICS



Nyheder | DR x Motorola Solutions - Co... x Meet - F2F - Strateg... x Anhalter Straße 2, Berlin... x Upload Something x

Secure | https://ukpoliceimageappeal.co.uk/upload/choose

DR flandersnews.be Het Weer MSI Belgien Finance Spectrum FB JP JP Yr Standards W Wiki Cykle WhatsApp Politico Other bookmarks



Public Appeal For Photos/Videos

Please use this web page to upload digital photos and video files that relate to the Police appeal for images. You can upload image files that have been taken with mobile phones; digital stills cameras or video cameras. A Police officer or a professional staff member will review images you upload to us as quickly as possible. Due to the high volume of images we expect to receive, we may not reply to every submission; however, we appreciate the images that you have provided.

Operation/Incident: Murder in Ilford High St on Sunday 12th November 2017

Description: Murder occurred in Ilford High St junction Connaught Road, Ilford in the early hours of Sunday 12th November 2017

Please provide your details

First Name

15:15 14-11-2017

FORENSIC VIDEO ANALYTICS (FVA)



- **Image processing**
 - Deblurring,
 - dehazing,
 - video stabilization
- **Super-resolution**
- **Image registration**
- **Image rectification**
 - a transformation process used to project two-or-more images onto a common image plane.

SUPER-RESOLUTION



Fuse details from multiple video frames for obtaining a single enhanced image



IMAGE REGISTRATION



Registering and summing multiple exposures of the same scene improve signal to noise ratio, allowing one to see things previously impossible to see. In this picture, the distant Alps are made visible, although they are tens of kilometers into the haze.





STANDARD ACTIVITIES

MC VIDEO STANDARD – 3GPP



Release 14



- 📶 In stage 1 and 2, MCPTT split into Mission Critical general aspects and MCPTT-specific aspects
- 📶 Enhancements
 - General Mission Critical Aspects (among them MBMS enhancements)
 - MCPTT-specific enhancements
- 📶 New Features
 - Mission Critical Data
 - Mission Critical Video



Mission Critical Africa, Cape Town - 7 November 2017

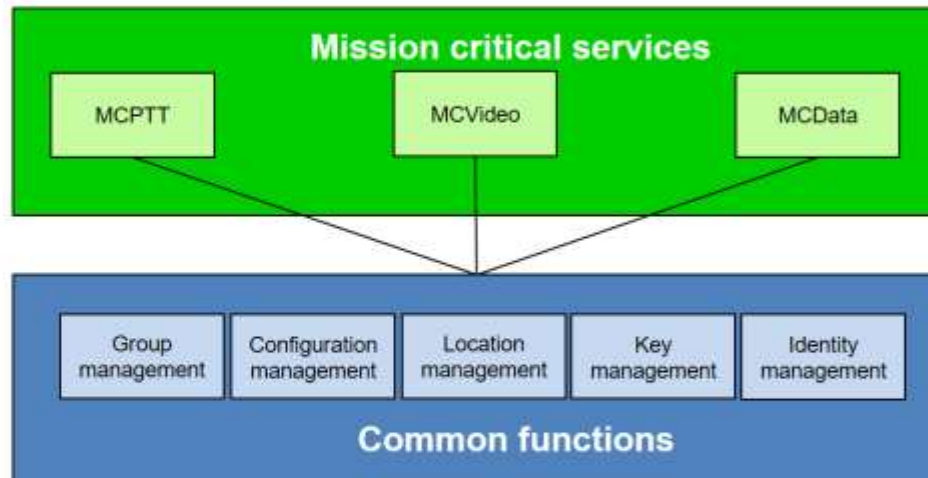
© 3GPP 2017

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COMMON FUNCTIONAL ARCHITECTURE



Common functional architecture



- Common approach for use of identities, control of communication sessions, group affiliation etc.
- MBMS enhancements
 - Signalling of bearers, sharing between servers, quality detection....

Mission Critical Africa, Cape Town - 7 November 2017

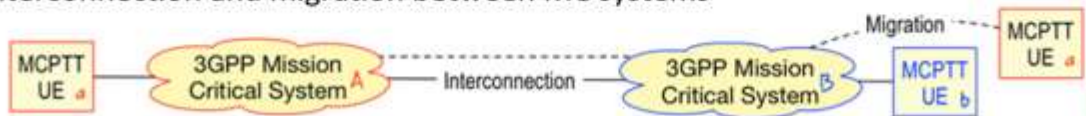
MISSION CRITICAL



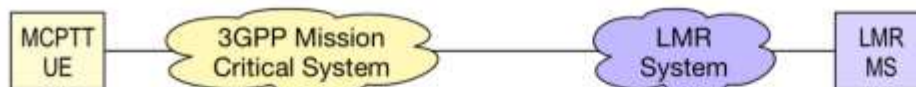
Release mission critical 15 work



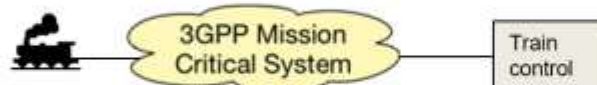
- Enhancements to MCPTT, MCVideo, MCDData
- Enhancements to MBMS service
- Interconnection and migration between MC systems



- Interworking with LMR systems



- Study into Future Railway Mobile Communication System



- Study into generic 3GPP APIs

Studies presented to SA76 in June 2017. Normative work in Rel 15.



VIDEO STORAGE & OPERATIONAL USE



- **Store high quality on location**
 - Upload at base
- **Upload to cloud**
 - Public service
 - Amazon, Google, Microsoft ??
 - Private – OnPremise

BODY WORN VIDEO



- **Have a policy in place**
 - When to turn it on? When to turn it off?
 - When to upload? What quality?
 - Who shall delete? When shall deletion take place?
 - Where to store? Public provided cloud? Private cloud?
 - Retrievability – Meta data – GPS, T&D, ISSI, GSSI.
- **Great for de-escalation, documentation,**
- **You will be hit with two problems**
 - Enormous amount of data
 - Public will want a copy
- **Is the lens capability better than the officers eye?**
 - You don't want evidence presented that an officer couldn't see.

HOLOLENS



- [Microsoft Hololens](#)

Future of Crime Scene Investigation Using Hololens



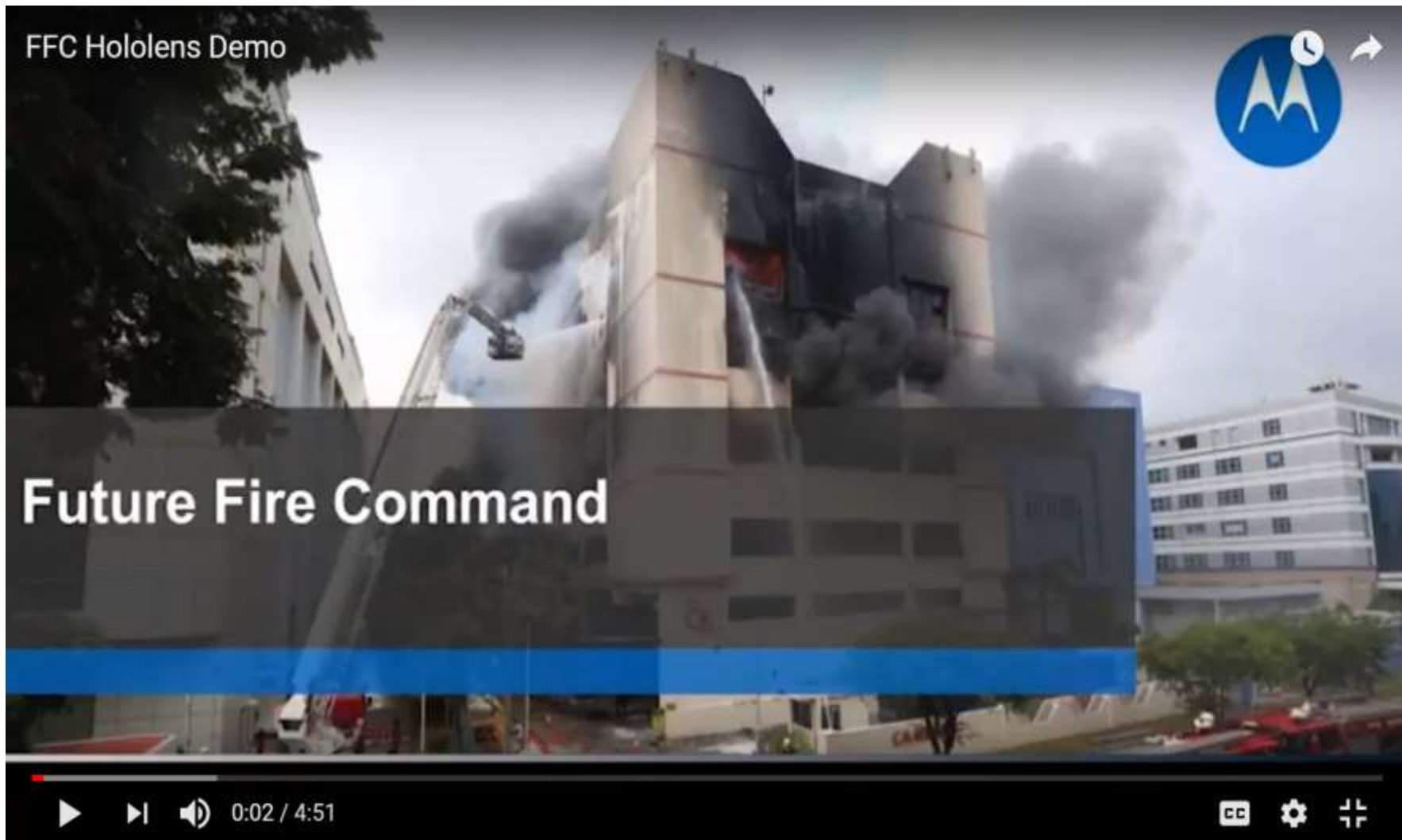
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FUTURE FIRE COMMAND



- [Fire situation](#)



360

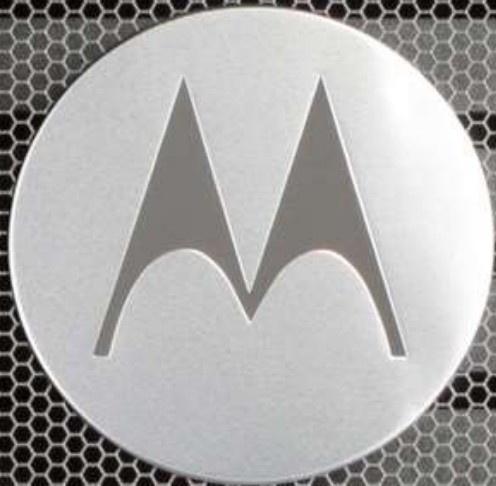


FUTURE FIRE COMMAND



- [Fire situation](#)





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