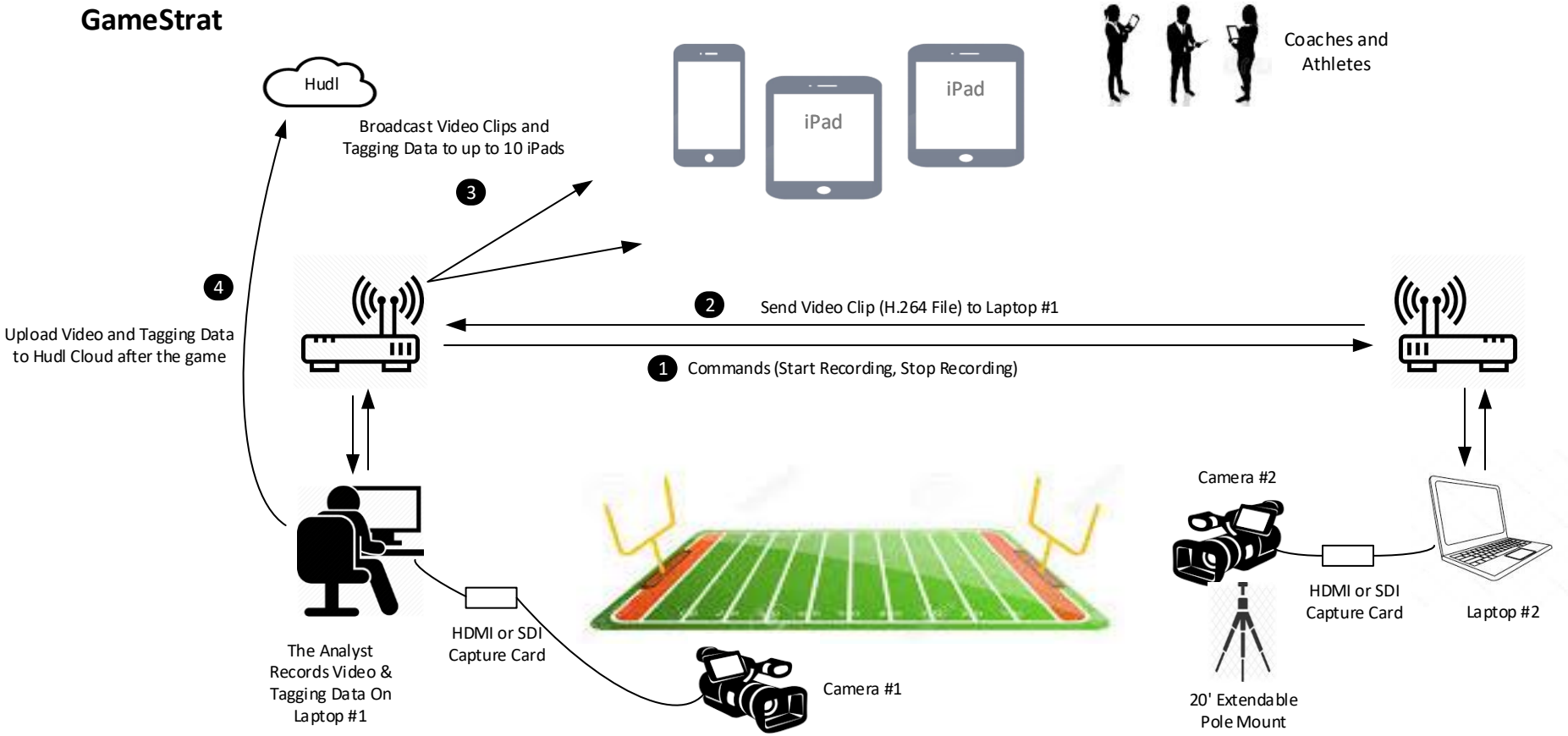
GameStrat



Estimated Capital Costs - School

Camera #1	$1,500
Camera #2	$1,500
Laptop #1	$700
Laptop #2	$700
iPads	$500 each (optional)
Total	$5,000+ Hardware

Estimate Capital Costs – GameStrat

Capture Card #1	$200
Capture Card #2	$200
Wi-Fi Network	$300
Annual Charge	$1,500/Year

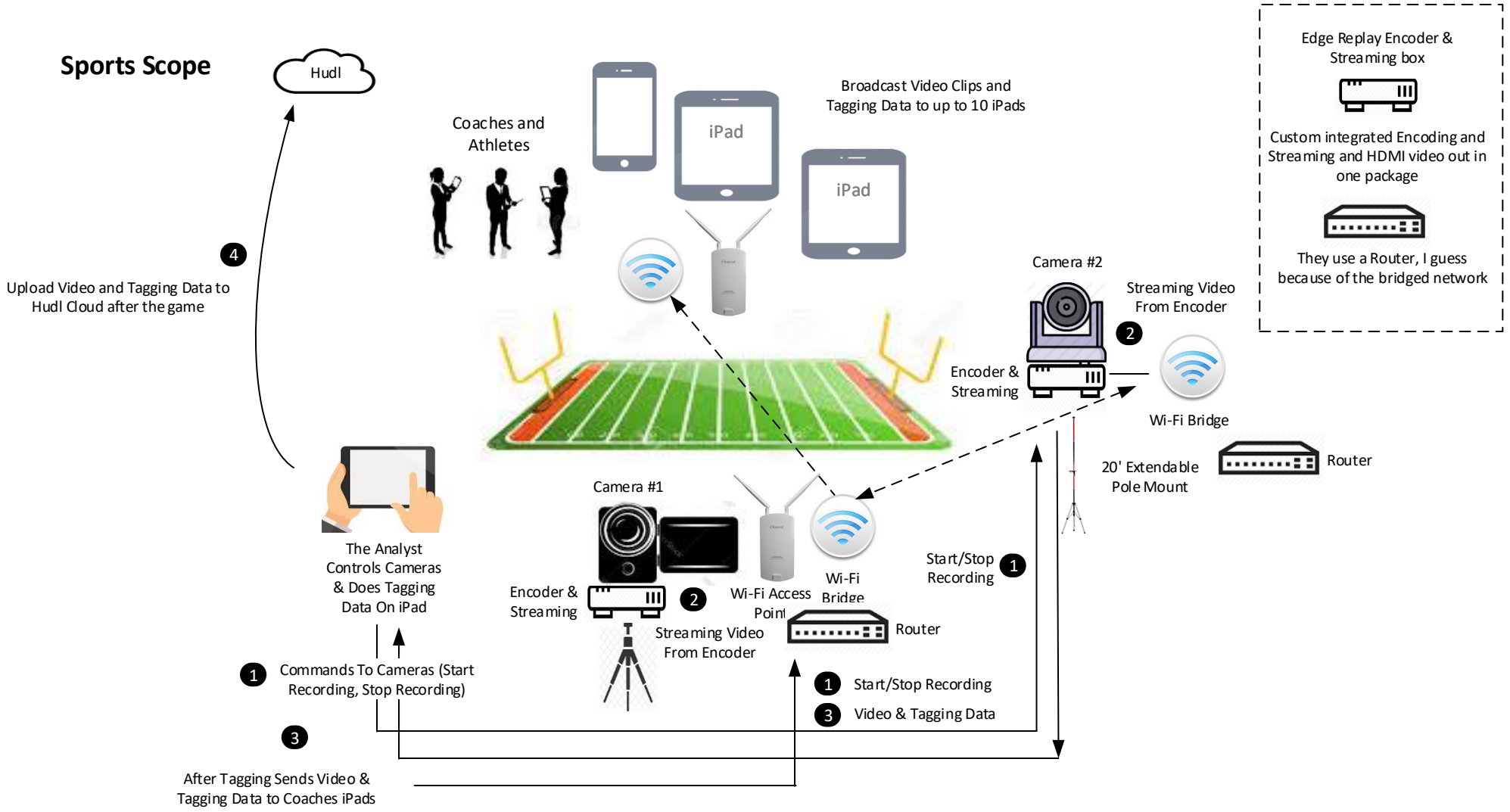
Product Definition

Enter the game title and notes when the analyst starts the application
All files and metadata are consolidated on laptop #1
Press space bar on laptop #1 to start and stop recording on both laptops
Video is copied from laptop #2 to laptop #1 as soon as recording stops
Update tagging data as desired, press “confirm” and files copied to iPads
The two camera angles are frame accurate and same duration for replay
The tagging includes some simple automation for convenience
The coach can carry the iPad into locker room since it has all video
The iPad basically has the same UI as found on the laptop; can filter metadata and view only selected items; also have a summary report
They make it easy to delete the game video from laptops or iPads
They provide 24/7 technical support
They provide the following hardware: Wi-Fi Router, HDMI Capture Device, Cables, and Transit Case for $875 per year; renewal years are discounted.
This implies the customer does not own the video capture hardware kit; it must be returned if service is not renewed.
Upload video and tagging data to Hudl for sharing after the game

Observations

They do not try to compete with full range of Hudl product
They support uploading the video and metadata to Hudl afterwards
The HDMI capture card provides pretty good quality
The Ubiquiti network is the older model, not the mesh products
The end zone laptop is unattended. The camera #2 PTZ is still available
Claim Hudl has a problem because master iPad is a bottleneck
They also have a backup option to use iPad to record videos using onscreen tags
It seems easy to setup; the equipment is sold in a bundle and kitted
The cameras can be cheap since they don’t require streaming support
This could be used for streaming if they used an HDMI splitter from the camera #1 and then ran the second stream to an encoder
This is a simple, low cost, entry level solution that would be attractive to a single coach.
Not sure if it would work as well for continuous sports where the clips are much longer
It is Windows based so it will be easier for most people to use and administer; also Windows 10 is reliable on laptops

Sports Scope



<u>Estimated One Time Capital Costs - School</u>

Camera #1 setup	$2,000 (with tripod)
Camera #2 setup	$4,000 (with pole)
iPads (2 or more)	$1,000+
Total	$6,000+ Hardware

<u>Ongoing Software Costs – Sports Scope</u>

Camera Angle #1	$499/Year
Camera Angle #2	$499/Year
Camera Assist	$499/Year (Optional)
Annual Charge	$1,500/Year

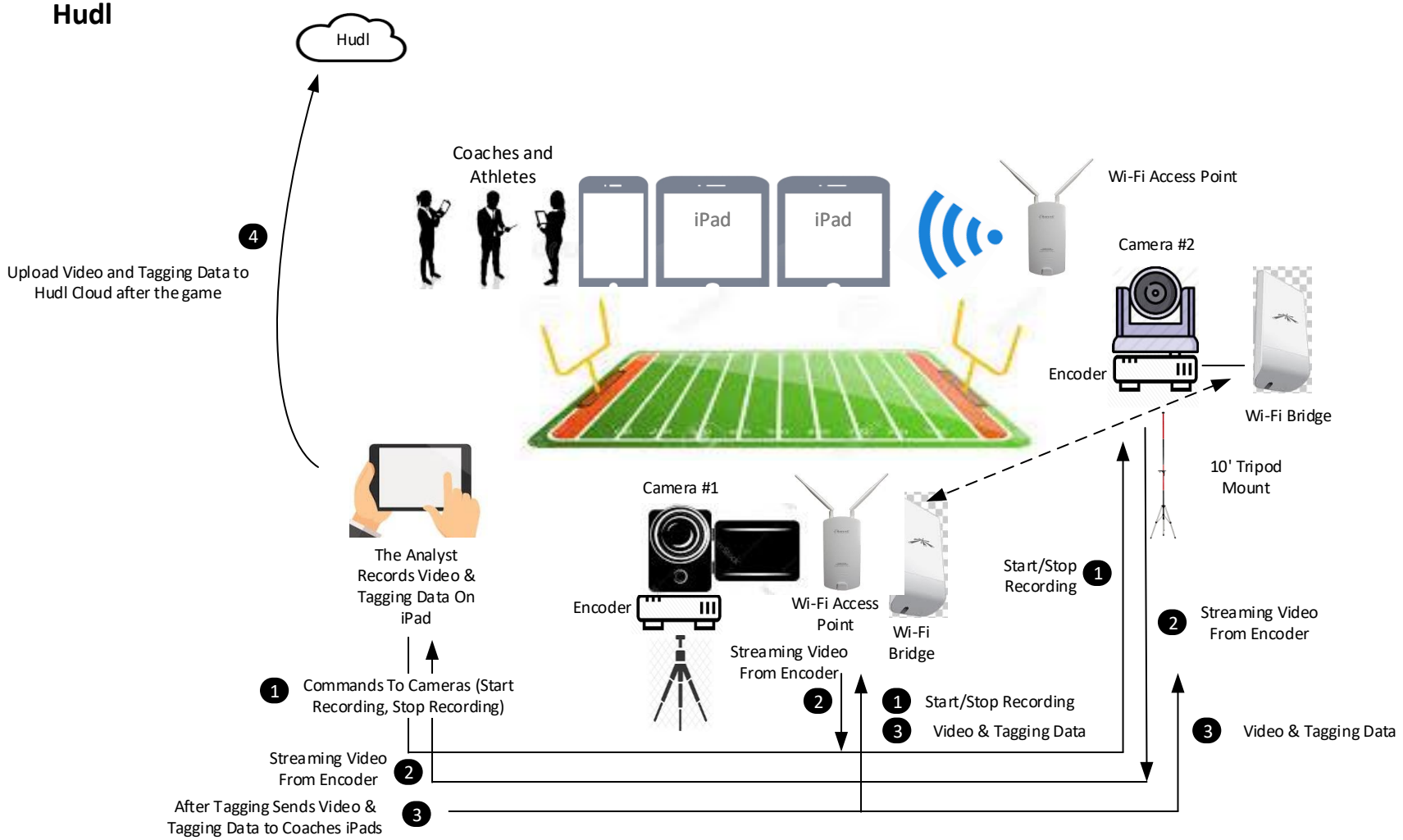
<u>Product Definition</u>

Setup the hardware before the game. Equipment includes video monitors for the staff which are connected by an HDMI cable
Enter the game title and notes when the analyst starts the application
All video files are captured and encoded and streamed from the "Edge Replay" box which is some type of repacked commercial product, maybe with Linux.
Press red button on iPad to start and stop recording from cameras
The videos are recorded on the Edge Replay and then send to the coaches iPad
They claim in their website that the video transfer is very fast
They offer a new feature called "Camera Assist" which seems to be a video analytics application which centers the PTZ feature of camera #2 on the center of the field where most of the action occurs. The tracking does not seem good
Upload video and tagging data to Hudl for sharing after the game

<u>Observations</u>

This company seems to be more focused on the hardware setup
They recommend poles from 10 feet to 30 feet and PTZ hardware
The customer buys the hardware and then licenses the software
The cameras are entry level Sony cameras
The Wi-Fi equipment is previous generation Ubiquiti hardware
They create a stadium Wi-Fi network with bridges, with a smaller network in the press box and sideline using cheap Wi-Fi access points
I am not sure what capture, encoding and streaming equipment they use inside the boxes
They also provide a transit case with batteries and cabling built-in
The UI on the tagging app is pretty awful

Hudl



<u>Estimated One Time Capital Costs - School</u>

Camera #1	$1,500
Camera #2 setup	$1,500
iPads (2 or more)	$1,000+
Total	$4,000+ Hardware

<u>Ongoing Software Costs – Sports Scope</u>

Camera Angle #1	$900/Year
Camera Angle #2	$600/Year
Annual Charge	$1,500/Year

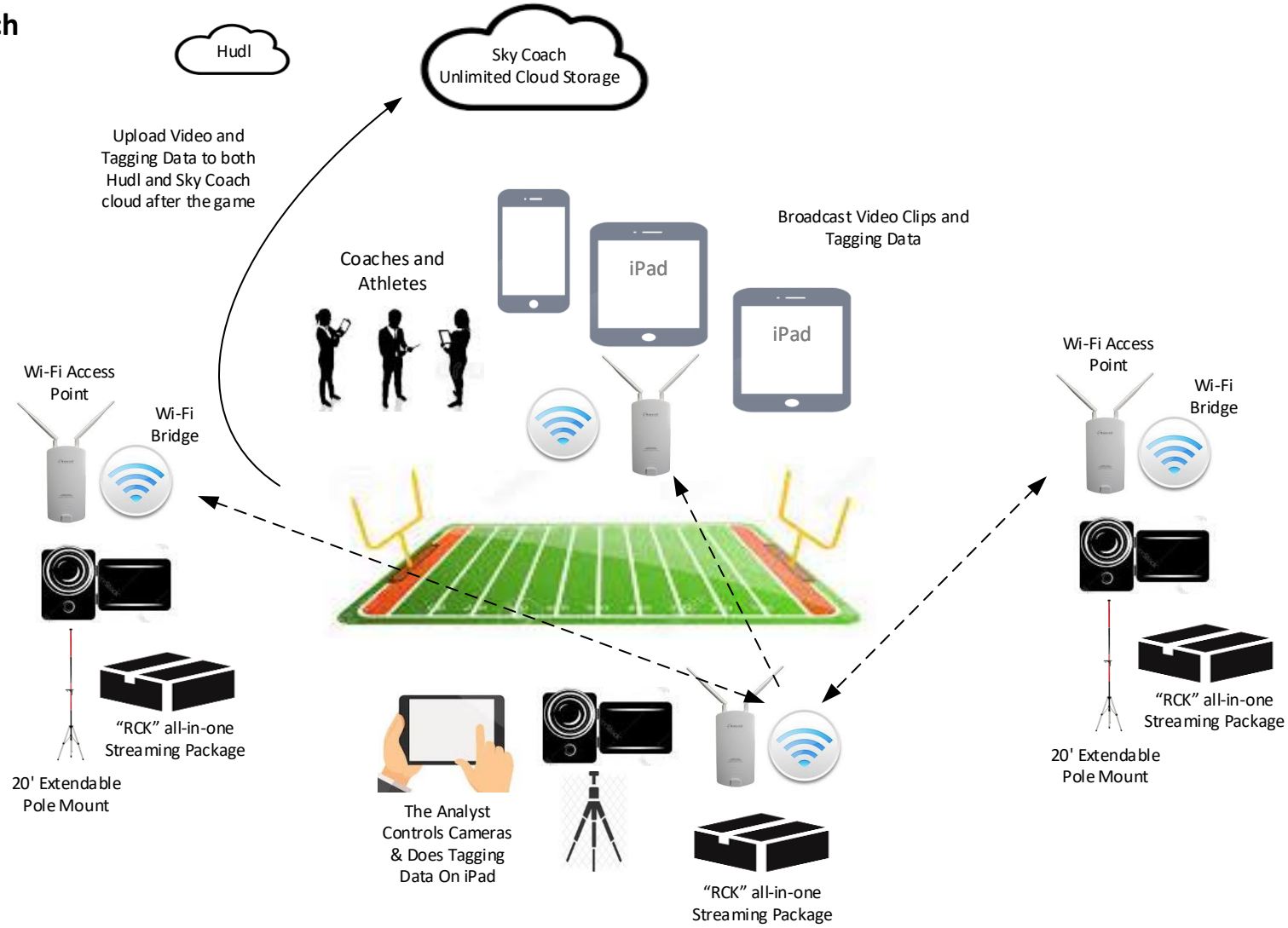
<u>Product Definition</u>

Setup the hardware before the game. Both press box and sideline kits come in a transit case with all the components permanently mounted in the case
The advantage of this is the case is weatherproof.
The end zone camera uses HDMI to connect to a Teradeck encoder which compresses the video to H.264 and streams it to the Wi-Fi and back to the iPad
The iPad is used to start and stop the recording. This setup would not have control over the cameras, so the iPad must just ignore the video streams from the cameras when not recording.
The clips are then sent from the master iPad to the coaches iPads on the field using the sideline Wi-Fi access point.
This does not seem like a very efficient design to me. A lot of expensive equipment and a bottleneck with the master iPad.

<u>Observations</u>

Some of the comments seen on the Internet say the service is unreliable
They say it is because the master iPad has to upload and stream the videos to the coaches on the sideline and is a bottleneck.
Hudl license is per sport, so if multiple teams at a school want to use it, they must negotiate a higher price.

Sky Coach



<u>Estimated One Time Capital Costs - School</u>

Camera #1 setup	$2,000 (with tripod)
Camera #2 setup	$2,000 (with pole)
iPads (2 or more)	$1,000+
Total	$5,000+ Hardware

<u>Ongoing Software Costs – Sports Scope</u>

3 Camera Angles $2,000/Year

Includes the RCK device & Wi-Fi Equipment

<u>Product Definition</u>

The all-in-one streaming device (called Remote Camera Kit – "RCK") included is a small case with a **display** and built in computer and streaming encoder. The video capture is saved on the RCK but controlled by an iPad in the press box. This is not really any different than using a laptop at each camera location, it just hides the configuration.

They also allow up to 2 iPads or iPhones to record video and include in the recording.

Another thing that is different about Sky Coach is they include unlimited cloud storage for sharing the videos. This could be a big expense, I am surprised they are willing to do this. They allow iPhones and iPads to send videos directly to the cloud for review (but not editing).

<u>Observations</u>

The RCK product is new this year. It will not get much use due to Covid

They have very little marketing on their website. I am not sure why.

Even YouTube tutorials have not been updated for several years.

They place a lot of emphasis on live support, 24/7 email support, phone support on game nights, webinars and live online training.

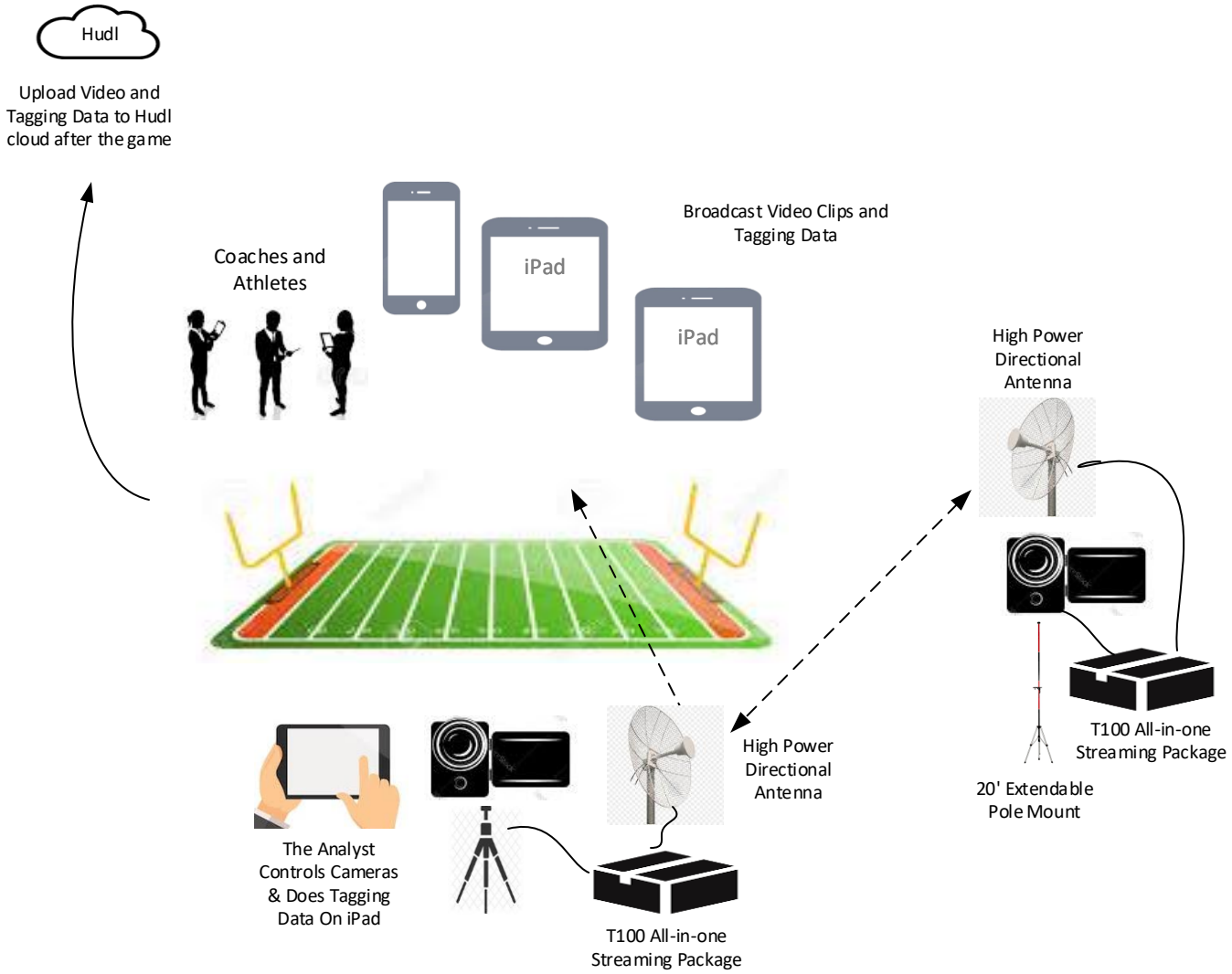
Their package can be used by all the schools sports.

They mention how competitive systems like Hudl have Wi-Fi interference problems due to more powerful commercial Wi-Fi systems used in some stadiums.

They claim advanced tagging, I was unable to find an example of this.

They do not include a battery for the sidelines, call out need for external power or generator. Not sure why?

Echo 1612



Estimated One Time Capital Costs - School

Camera #1 setup	$2,000 (with tripod)
Camera #2 setup	$2,000 (with pole)
iPads (2 or more)	$1,000+
Total	$5,000+ Hardware

Ongoing Software Costs – Sports Scope

2 Camera Angles	$3,400/One Time Cost
Includes the T100 device, router & antenna	
Software	$400/Year Ongoing

Product Definition

The all-in-one streaming device called the "T100" included is an industrial computer with built-in battery and HDMI encoder. The video capture is saved on the T100 but controlled by an iPad in the press box.

This is also no different than using a laptop at each camera location, it just hides the configuration. They claim the T100 can store all the video for the entire season, so it must have a large SSD drive internally.

They still have a router and use a unique high power antenna to connect the end zone and press box. The Wi-Fi router requires a battery.

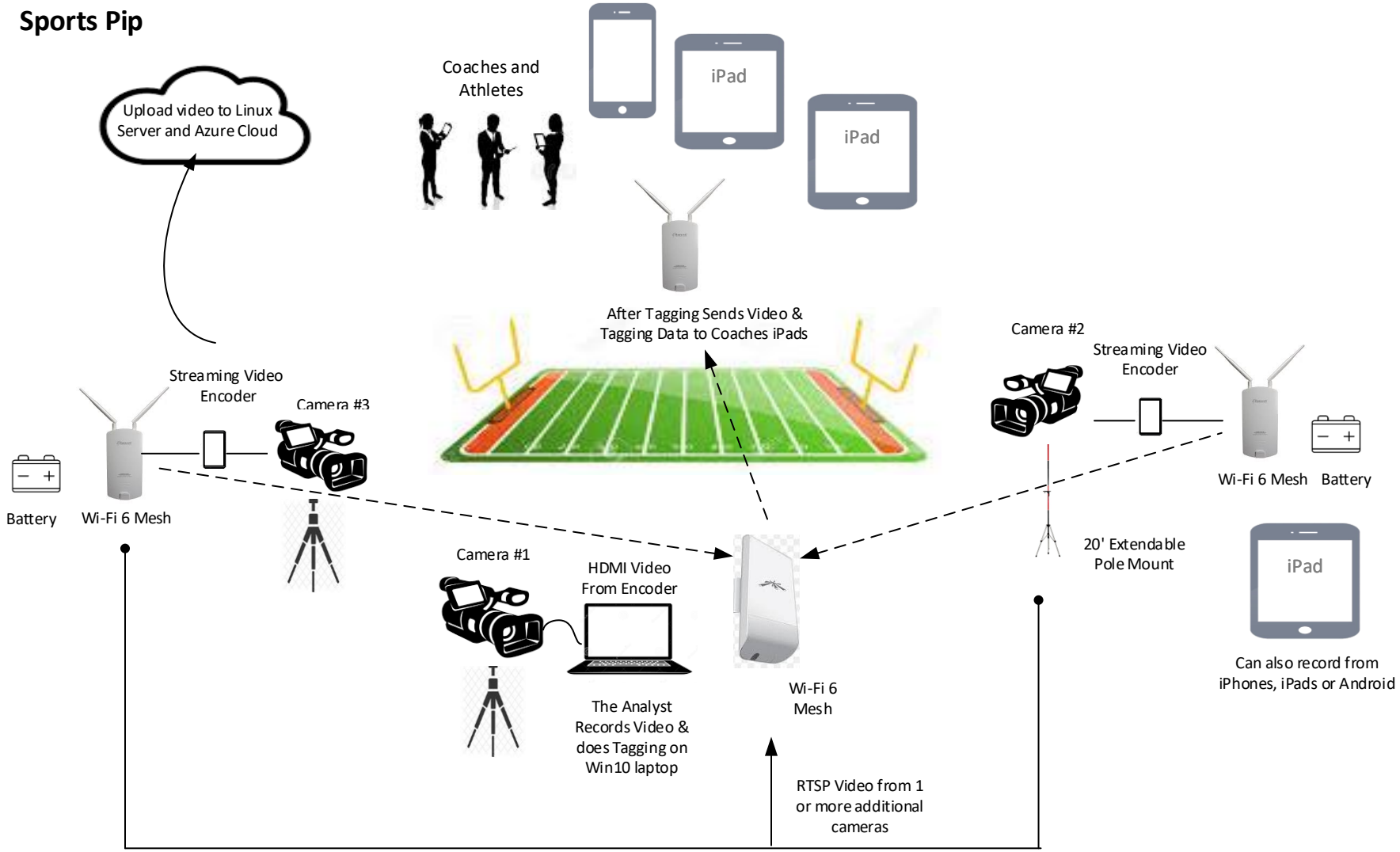
To record, they suggest pressing a button on the T100. This can't be the only way to record, they must still support using the iPad to tag and start and stop recordings.

Observations

They have replaced using laptops with this all-in-one T100 package.

I am not sure what they are doing for the iPad users. Are they on the same Wi-Fi network as the high power directional antenna or does the T100 have build in Wi-Fi access point?

Sports Pip



Estimated One Time Capital Costs - School	
Camera	$3,000 for 2 cameras
iPads	$1,000 for 2 iPads
Laptop	$700 for laptop
Wi-Fi Equipment	$400 for 2 cameras
Batteries	$150 for 1 battery
Encoders	$400 for 2 RTSP encoders
Total	$5,650 for hardware

Ongoing Software Costs – SportsPip	
Editing Software	$500 / year

Estimated One Time Capital Costs – School	
Already Available	
Already Available	
Already Available	
Wi-Fi Equipment	$400 for 2 cameras
Batteries	$150 for 1 battery
Encoders	$400 for 2 RTSP encoders
Total	**$950** for new hardware

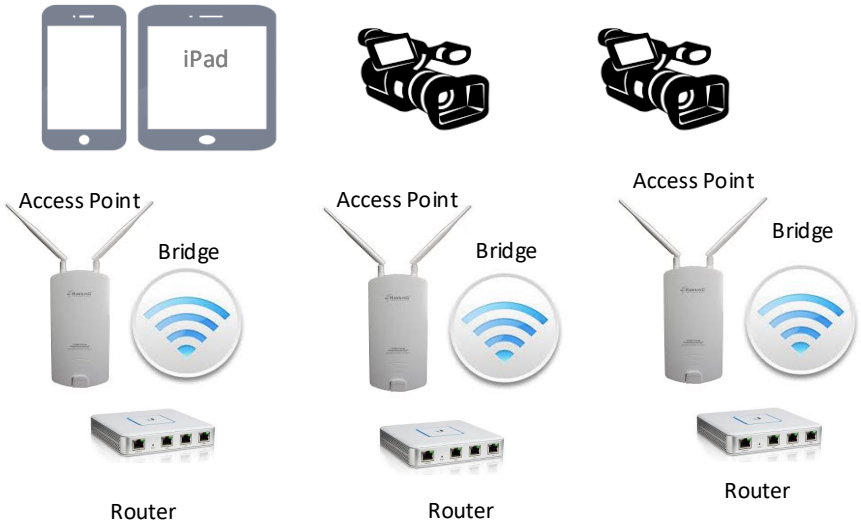
Ongoing Software Costs – SportsPip	
Editing Software	$500 / year

If they already have the laptop, cameras and iPads the equipment cost is even lower.

NETWORK COMPARISION

Competition Uses Legacy Wi-Fi Equipment

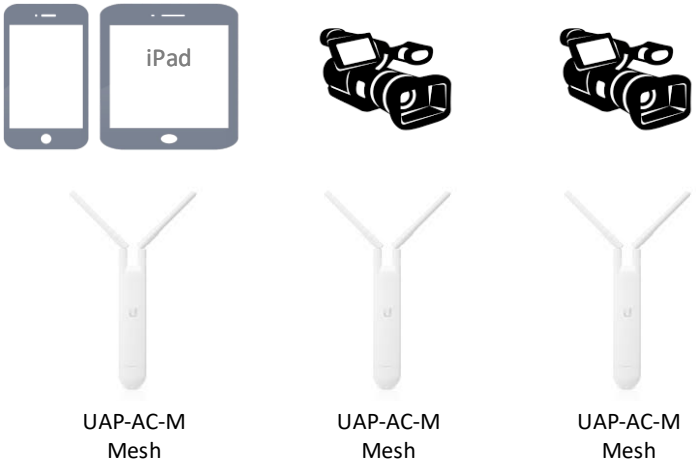
When using a bridge to connect to a remote network in a stadium you need the bridge, router and Wi-Fi access point at every location. This is why the other companies have so many pieces of equipment needed. *Older Wi-Fi equipment is also more susceptible to interference.*



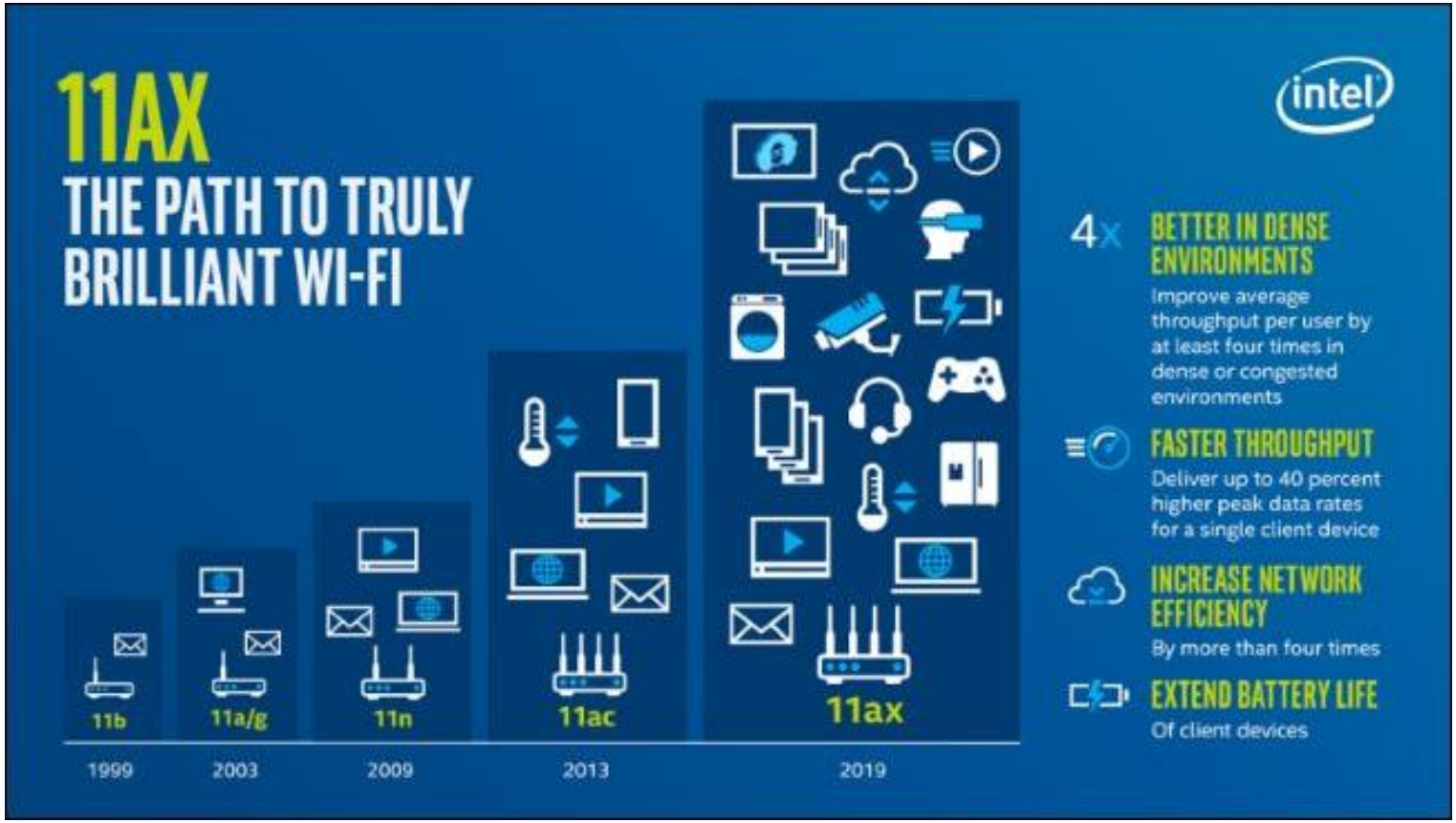
THEM

We can Start with Modern Wi-Fi Equipment

The new Mesh Wi-Fi MIMO networks have multiple radios at 2.4 GHz and 5.0 Ghz which can transmit and receive at the same time. No router needed. *Also, arriving this year is Wi-Fi 6 which greatly improves performance and resistance to interference.*



US



This is what Intel says about Wi-Fi 6 (also known as 802.11ax)

Hudl

Teradeck Encoder

Encode HDMI video to H.264 RTSP and stream to iPad

Game Strat

Laptop

Uses HDMI capture card to record to laptops and then copy to iPads

Sports Scope

Edge Replay

Custom computer with built in HDMI capture and copy to iPads

Sky Coach

Remote Camera Kit (RCK)

Custom computer with built in HDMI capture and copy to iPads

Echo 1612

T100

Custom computer with built in HDMI capture and copy to iPads

SportsPip

Laptop

Uses RTSP capture card to record to laptop and then copy to iPads

These companies need a laptop or a custom built computer at every camera location because they had networking problems using Wi-Fi on older versions of technology.

To solve their Wi-Fi problems they recorded video from the camera on every local device, and then transfer the video to the coaches laptops.

I don't think we will have the same problems with Wi-Fi networking on the new Wi-Fi 6 (802.11ax) mesh networks .

GameStrat

Sports Scope

https://www.sportscope.com/sideline-replay-review-edge-vs-hudl.php

https://www.sportscope.com/compare-instant-replay.php

https://www.sportscope.com/edge-replay.php

https://vimeo.com/273043264

https://www.youtube.com/watch?v=fZn11qtDn4w

https://www.youtube.com/watch?v=WrNzg2HBhYo

Hudl

https://player.vimeo.com/video/313219245

https://www.hudl.com/support/sideline/videos/premium-hardware-setup

https://www.hudl.com/support/sideline/videos/the-sideline-advantage-instant-feedback-for-your-team

Sky Coach

https://www.youtube.com/watch?v=rDH8LHqHNLQ

https://www.myskycoach.com/instant-replay-news/eliminate-computers-rck

https://www.myskycoach.com/instant-replay-news/skycoach-replay-and-hudl-sideline-comparison

https://www.myskycoach.com/testimonials

Echo 1612

https://www.sportscope.com/comparison-edge-vs-echo.php

SportsPip

https://www.howtogeek.com/368332/wi-fi-6-what%E2%80%99s-different-and-why-it-matters/

GameStrat

Possible Competitive Responses

- Don't rent them the hardware. They can buy themselves from an approved hardware list and links to B&H shopping cart.
- Make the tagging experience better.
- Move tagging off-screen; or overlay the video which is not critical
- Support a Windows laptop for video capture (if needed).
- The video on the laptop is not really used, even the tagging and filtering is mainly for the coaches benefit, not the cameraman.
- It might be useful at halftime for full screen playback.
- Collect more data and generate more detailed reports.
- Allow the coach to do more analysis offline after the game is over.
- Look for other ways to automate the tagging.
- Support higher resolution video recording; faster frame rate.
- Automate the second camera PTZ function so it tracks the primary camera.
- Support live streaming over the internet (LAN or hotspot).
- Support more than 2 HD camera configurations.
- Support more than 10 iPads for coaches.
- Support devices other than iPads, like a TV monitor from a laptop
- Use SDI cameras & cables for remote cameras (up to 100m).
- The tagging data could be used to provide score and quarter information is an on-screen graphic when live streaming.
- Maybe use a Raspberry Pi as a Linux server?

Our Disadvantages

- We are primarily focused on the Linux server, this means more complexity for not technical users, including the cameraman.
- No one has a laptop with Linux installed on it, this scares people and makes the laptop into a dedicated device for our event.
- Streaming may be a bigger technical problem in busy areas than expected, so HDMI capture card is a cheap and easy solution.
- My tendency is to go to the high end solution. I don't mind paying a lot for cameras, many coaches will not feel this way.
- We need to make it possible to participate from a lower entry.
- If we allow other users to record to the server wirelessly we use up some of the bandwidth and might compromise something the coaches depend on.

Final Analysis Coming Soon