CAMERA ANALYTICS & EMERGING TECHNOLOGIES

2022 Midwest Facility Masters Conference | October 31, 2022

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Kenosha Unified
SCHOOL DISTRICT

AGENDA

1) Disclaimers
2) Evolution of Camera Technology
3) Camera Density
4) Costs
5) Video Analytics
6) Integration With Other Technologies
7) Future (Piloting) Technologies
8) Potential Pitfalls
9) Q & A

DISCLAIMERS

First things first – I do not consider myself an expert in all things security, especially the technology side – so don't hesitate to speak up if you have other thoughts or perspectives…

DISCLAIMERS

Camera systems and other security technologies are *not* the backbone of an effective school safety program; instead they are one of the many layers that should be part of a comprehensive safety program, so it's important to keep that in mind.

EVOLUTION OF CAMERA TECHNOLOGY

- What started only a few decades ago with local analog cameras is now a high tech industry.
- In 2021, schools and colleges in the U.S. spent an estimated $3.1 billion dollars on security products and related services.
- In the last 20 years, we went from less than 20% of schools having at least one camera to well over 80% of schools having cameras (and generally lots of them) today.

Most Common Types of Cameras

Bullet Cameras

Most Common Types of Cameras

Dome Cameras

Most Common Types of Cameras

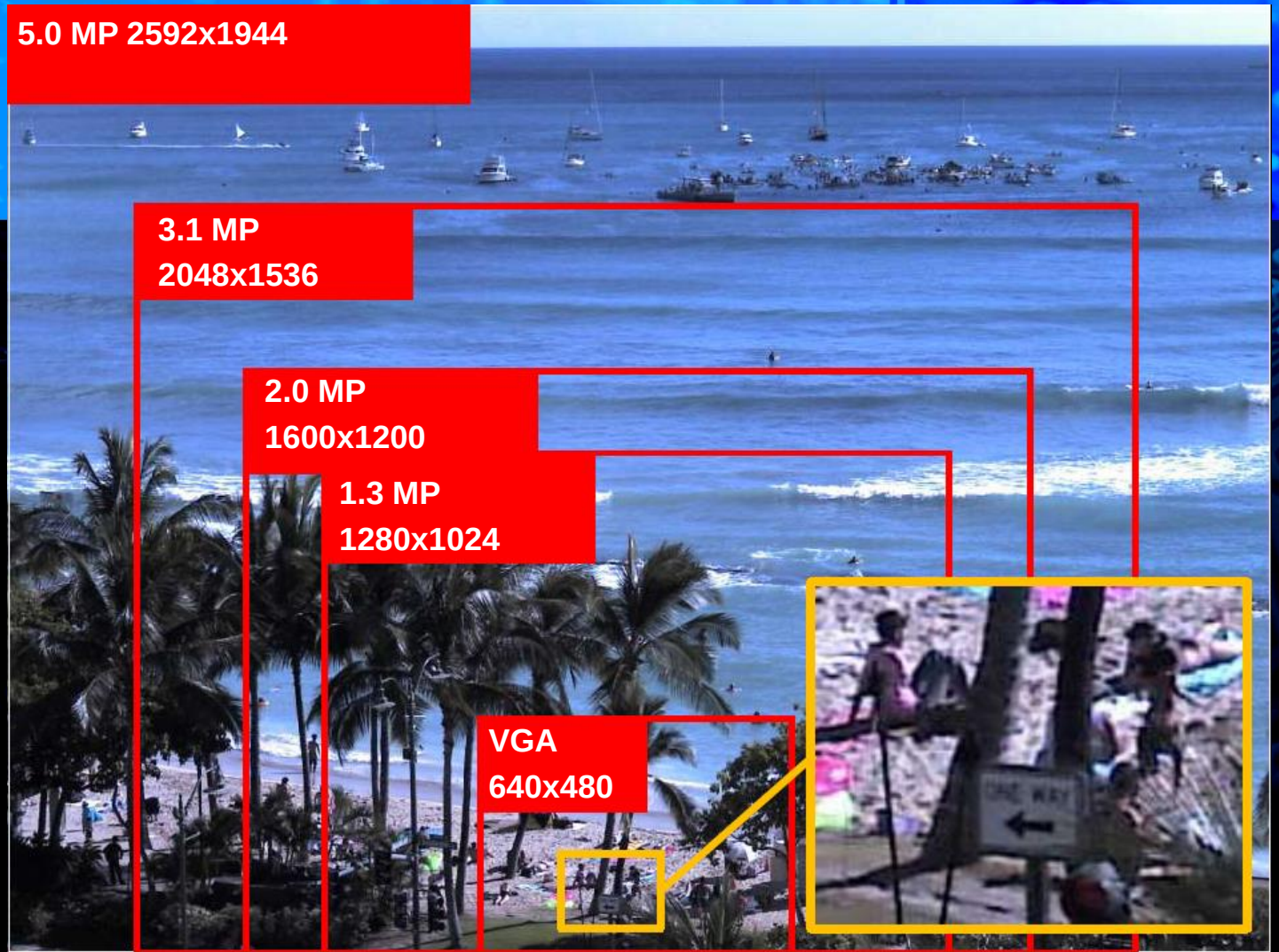
Pan-Tilt-Zoom Cameras

Camera Resolution

Old Analog Cameras (circa early 2000s)

MP


5.0 MP 2592x1944
(16.4x VGA)
3.1 MP 2048x1536
(10x VGA)
2.0 MP 1600x1200 (6.25x VGA)
1.3 MP 1280x1024
(4.25x VGA)
VGA 640x480


5.0 MP 2592x1944
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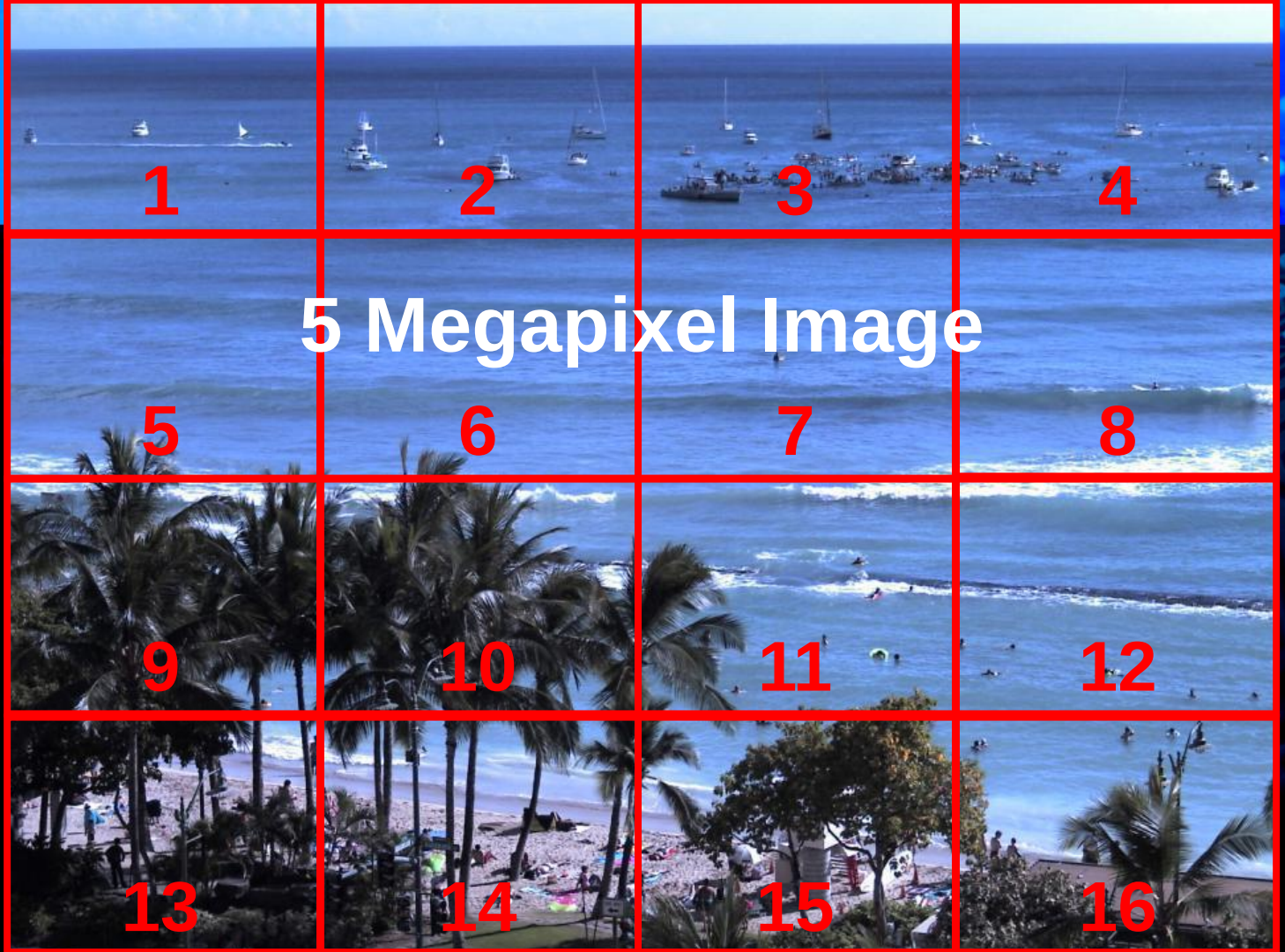
2048x1536
2.0 MP
1600x1200
1.3 MP
1280x1024
VGA
640x480


5 Megapixel Image
1
2
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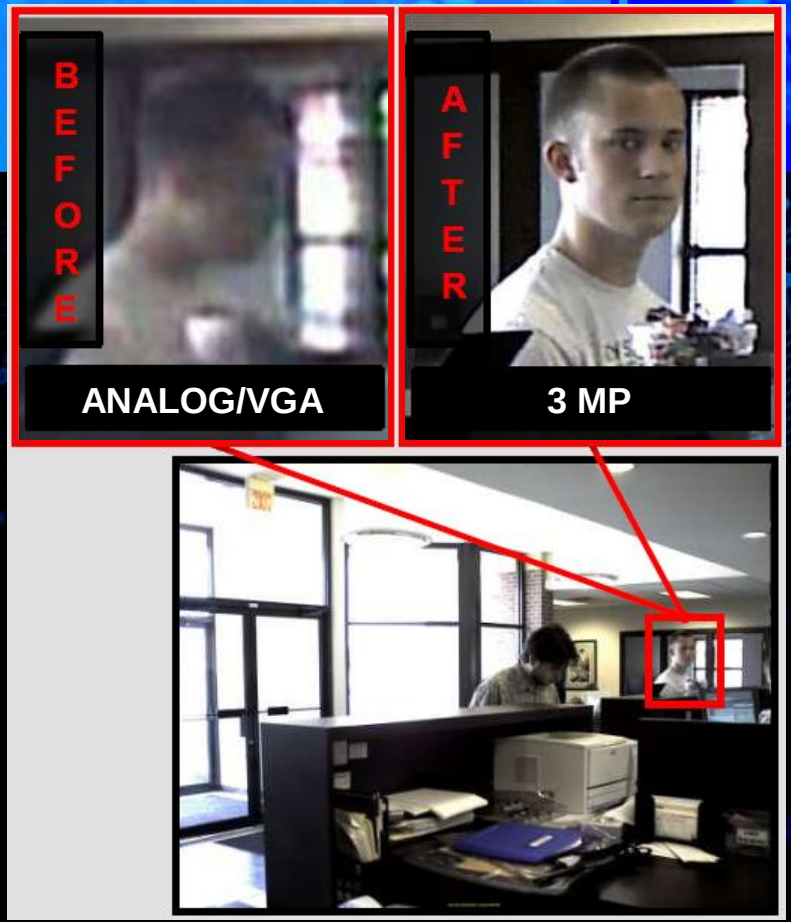
Replace Analog with MP

Analog vs. MP



Analog Camera

IP Camera

Identical Zoom level

Panoramic IP Camera: Default View


Bradford Stadium Stands North
9/9/2022 7:16:09 PM
Bradford Stadium Stands East
9/9/2022 7:16:09 PM
Bradford Stadium Stands South
9/9/2022 7:16:09 PM
Panoramic IP Camera: Zoom Level

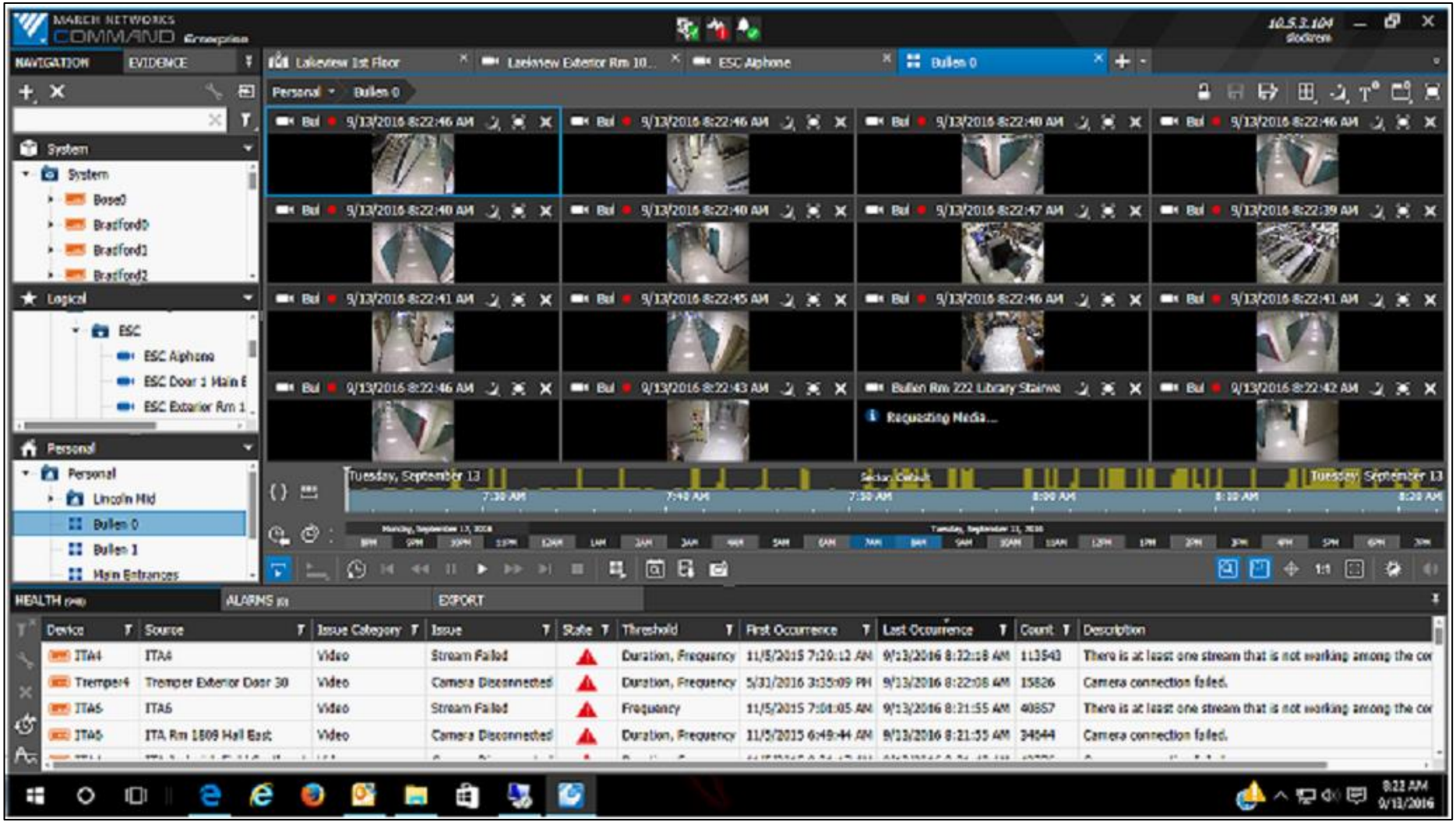
Old IP Camera

New Standard IP Camera

New Standard Exterior IP Camera

Head-End System & Storage

- **Wired / Wireless**
- **Server Options/Cloud**
  - Separate network
- **Storage: Minimum of 30 days of retention**


MARCH NETWORKS COMMAND Enterprise
NAVIGATION
EVIDENCE
Lakeview 1st Floor
Lakeview Exterior Rm 10...
ESC Alphone
Bullen 0
Personal
Bullen 0
System
System
Boise0
Bradford0
Bradford1
Bradford2
Logical
ESC
ESC Alphone
ESC Door 1 Main E
ESC Exterior Rm 1
Personal
Personal
Lincoln Mid
Bullen 0
Bullen 1
Main Entrances
Bullen Rm 222 Library Stairwe
Requesting Media...
Tuesday, September 13
HEALTH
ALARMS
EXPORT
Device
Source
Issue Category
Issue
State
Threshold
First Occurrence
Last Occurrence
Count
Description
ITA4
ITA4
Video
Stream Failed
Duration, Frequency
11/5/2015 7:10:12 AM
9/13/2016 8:22:18 AM
113543
There is at least one stream that is not working among the cor
Tremper4
Tremper Exterior Door 30
Video
Camera Disconnected
Duration, Frequency
5/31/2016 3:35:09 PM
9/13/2016 8:22:08 AM
15826
Camera connection failed.
ITA5
ITA5
Video
Stream Failed
Frequency
11/5/2015 7:01:05 AM
9/13/2016 8:21:55 AM
40857
There is at least one stream that is not working among the cor
ITA6
ITA Rm 1808 Hall East
Video
Camera Disconnected
Duration, Frequency
11/5/2015 6:49:44 AM
9/13/2016 8:21:55 AM
34644
Camera connection failed.
8:22 AM
9/13/2016

CAMERA DENSITY

KENOSHA UNIFIED SCHOOL DISTRICT DATA

Kenosha Unified SCHOOL DISTRICT

Elementary Schools	Usable Sq Ft.	Analog Interior	IP Interior	IP Exterior	Total Cameras/Bldg
Bose	45,109	11	21	13	**45**
Brass	72,887	15	33	15	**63**
Chavez	20,500	12	16	11	**39**
DOL	30,509	11	-	10	**21**
EBSOLA	126,900	37	58	18	**113**
Forest Park	53,830	12	22	16	**50**
Frank	88,048	14	44	14	**72**
Grant	43,040	13	17	12	**42**
Grewenow	49,230	10	24	14	**48**
Harvey	47,980	12	29	12	**53**
Jefferson	36,575	9	15	11	**35**
Jeffery	45,209	12	19	14	**45**
KTEC-East	43,390	13	22	11	**46**
McKinley	35,085	10	23	13	**46**
Nash	73,636	13	26	12	**51**
Pleasant Prairie	73,306	13	36	14	**63**
Prairie Lane	65,778	12	21	13	**46**
Roosevelt	65,778	8	20	17	**45**
Somers	69,100	13	29	14	**56**
Southport	53,200	9	24	16	**49**
Stocker	80,621	11	31	15	**57**
Strange	57,192	11	12	11	**34**
Vernon/Brompton	88,280	16	41	15	**72**
Whittier	63,888	11	23	10	**44**
Wilson	38,200	11	17	16	**44**
				Elementary Total:	1,279

High Schools	Usable Sq Ft.	Analog Interior	IP Interior	IP Exterior	Total Cameras/Bldg
Bradford	300,607	-	163	50	**213**
Indian Trail	408,474	45	182	42	**269**
Lakeview	40,000	-	25	7	**32**
Reuther/Harborside	143,366	55	122	10	**187**
Tremper	313,802	-	115	50	**165**
				High School Total:	866

Middle Schools	Usable Sq Ft.	Analog Interior	IP Interior	IP Exterior	Total Cameras/Bldg
Bullen	121,962	-	52	13	**65**
Lance	137,290	-	74	15	**89**
Lincoln	134,038	40	36	17	**93**
Mahone	175,053	41	47	18	**106**
Washington	99,643	42	40	12	**94**
KTEC-West	101,622	42	38	13	**93**
				Middle School Total:	540

Other	Usable Sq Ft.	Analog Interior	IP Interior	IP Exterior	Total Cameras/Bldg
ESC	128,000	5	36	15	15
Hillcrest	22,405	10	7	10	10
Kenosha eSchool	12,953	5	-	9	9
Recreation Center		-	-	3	3
				Other Total:	37

Kenosha Unified District Totals:

3,606,486 Sq. Ft. **2,722** Cameras

CAMERA SYSTEM COSTS

DOOR ENTRY/ACCESS CONTROL SYSTEM		
Aiphone Video Door Station w/ Back box	Outdoor video door station/video doorbell for entrance doors	$ 1,000.00
Aiphone Video Desk Station	Indoor video desk station interacts with outdoor video door station	$ 1,000.00
Honeywell Two-Door Expansion Board	Head-end communication for card access system	$ 1,500.00
Electric Strike	Door lock that interfaces with card access system	$ 500.00
HID Proximity Card Reader	Allows for reading of proximity cards for card access	$ 200.00
HID Proximity Cards (Qty: 100)	Programmable swipe/keycards for card access	$ 600.00

CAMERAS & NVR SYSTEM	
March Networks 64-Channel NVR System*	$10,000.00
Digital Watchdog Indoor Surveillance Camera, 2MP	$275.00
Digital Watchdog Outdoor Surveillance Camera, 5MP	$320.00
Digital Watchdog Indoor/Outdoor Panoramic-View Camera, 8MP	$625.00

*Upfront cost and no annual fees; pricing is included in upfront cost of NVR and all updates are free while other systems' costs can range from $20 to $100 dollars per camera, per year (annual fee)

VIDEO ANALYTICS

Who Monitors & When?

- **Local at School**
  - Continuous at front desk
  - Continuous in attendance office
  - Continuous with SRO and/or deans
  - Administration
- **District Office**
- **Police**
  - 911 call center
  - Squad cars
  - Trained key individuals

Video Analytics

- **Storage: Minimum of 30-day retention period**
- **Head-end system – tools to increase efficiency in monitoring and retrieving**
  - Pairing of cameras
  - Ease of saving and watching footage
  - Floor plans with easy click-on camera icons
- **Resource for law enforcement in solving community crime**

Video Analytics

Play-By-Play Announcer

Video Analytics

- **Play-by-Play Options**
  - Remote locations at District office have access to intercoms
  - Also can pass along information to emergency response team over two-way radios, or text messages, emails, etc.

INTEGRATION WITH OTHER TECHNOLOGIES

- **Video Intercom Systems at main entrances**
- **Alert Systems**
  - Absolute most important feature → Reliability
  - Easy-to-use
  - Recognize not everyone will react the same → Automated Message
  - Quick

Alert System Failure Example

- **In 2019, Charlotte-Mecklenburg Schools, one of the largest U.S. school districts at more than 140,000 students, introduced an emergency alert system. It came from Centegix, an Atlanta company that promised that its wearable panic badges would provide all school employees with "an instant way to notify appropriate personnel and authorities" of emergencies or other incidents.**
- **The district spent more than $1.1 million on the system. But it later sued Centegix to recoup the funds after an investigation by The Charlotte Observer detailed defects in the badge service.**
- **Among other problems, the badges "repeatedly failed" to notify personnel, sent incorrect critical alert messages and caused "significant delays of critical safety information," according to legal documents filed in the case. The district settled with Centegix for $475,000.**

Alert System Failure Example

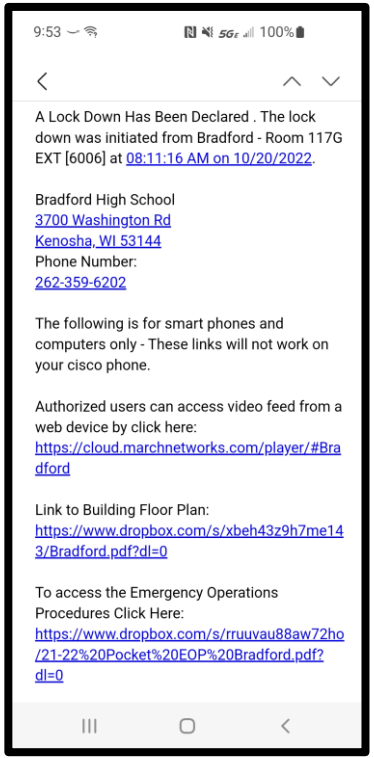
- **Cobb County was the first school district in Georgia to use AlertPoint, an emergency notification system developed by a local start-up. District officials said AlertPoint's wearable panic badges would help school employees quickly call for a lockdown or summon help in an emergency.**
- **Then, in February 2021, the AlertPoint system sent false alarms districtwide, leading to lockdowns at all Cobb County schools. District officials initially said AlertPoint had malfunctioned. A few weeks later, they announced that hackers had deliberately set off the false alerts.**

Alert System Integration

- **System Triggers**
  - Phone system
  - Push buttons in key locations (hard-wired)
  - Gunshot detection
  - TEST!

- **Integration with other systems**
  - Card Access System
  - ERT & First Responder Notification
    - Camera system link
    - EOP link
    - Details on location within school
      - Phone / Detector / Button
      - Room-initiated

Mobile Alert Example



Gunshot Detection

Gun Recognition Software

- ZeroEyes – U.S. Military Veterans
- Integrates with camera system
- A.I. software recognizes hundreds of different firearms
- Human review process before notifying school
- Gun must be visible for system to work

ZEROEYES
SAVE TIME. SAVE **LIVES**.

ZeroEyes Technology Explained

1 DETECTION

- Algorithm looks for visible firearms only
- No facial detection
- No PII, GDPR, CCPA, FERPA, etc. concerns

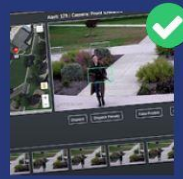
2 VISUAL DESCRIPTION

- Keyframe Image
- Timestamp
- Geolocation

3 HUMAN VERIFICATION

- Manned by US military veterans 24/7/365
- Every gun detection is verified within 1-3 seconds

4 GATHERING INTEL



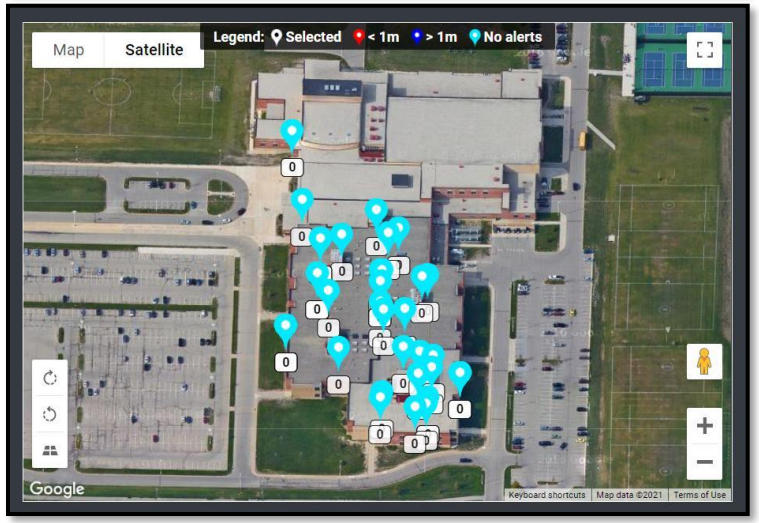
- Weapon type
- Real-time tracking
- Actionable intel

5 ALERTING

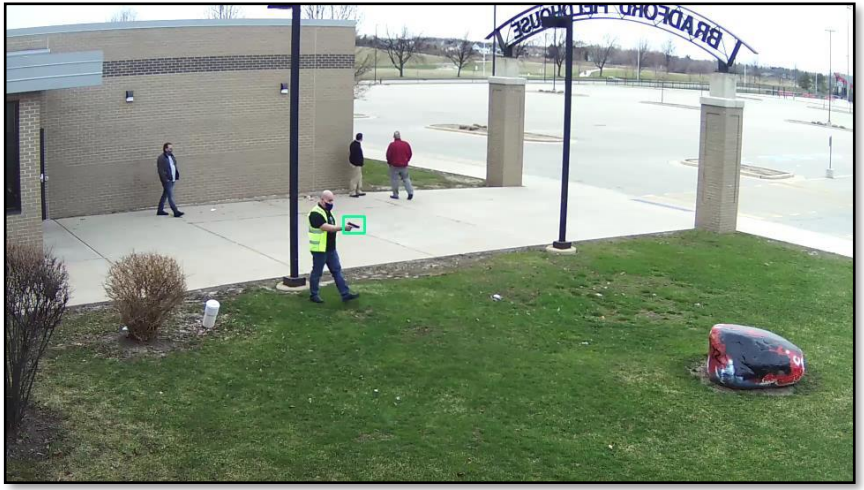
- ZE Client Platform
- Local Emergency Dispatch

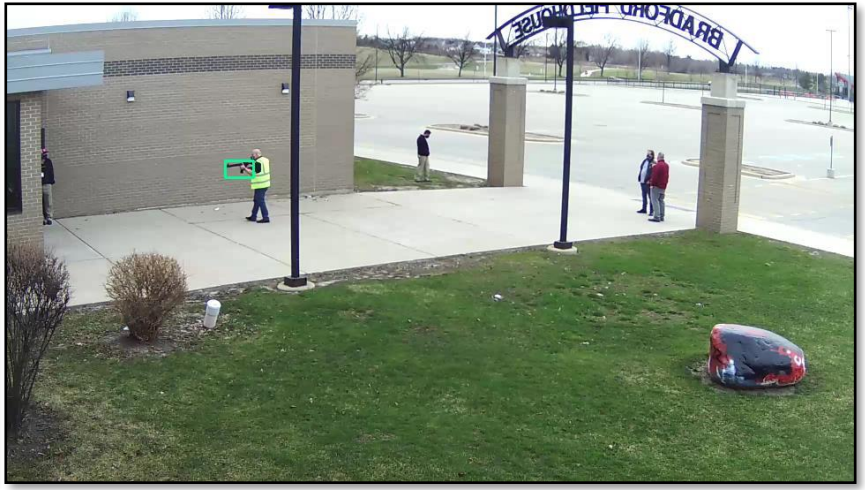
100% CAMERA UPTIME

- ZeroEyes monitors your system's operation 24/7/365
- We notify you of network or camera errors at no additional cost




Determination
DAWN BLVD

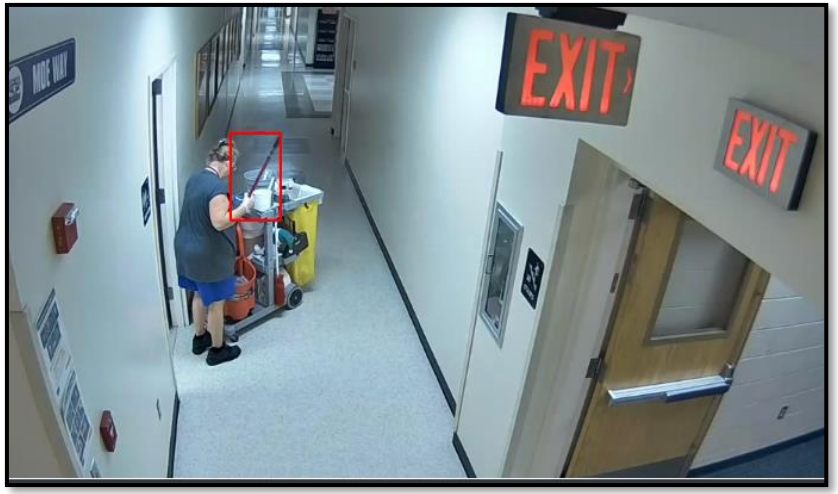




How ZeroEyes Prevents False Positives

A.I. can do remarkable things, but it can never be 100% accurate on its own. That's why we've built a unique human verification layer into our system.

Our software is trained to be ultra-sensitive, picking up any potential threat of visible firearms. Keyframe images are then sent to our operations center, which is staffed by military veterans who monitor every detection 24/7/365 to prevent false positives.



FUTURE (PILOTING) TECHNOLOGIES

COVID Examples

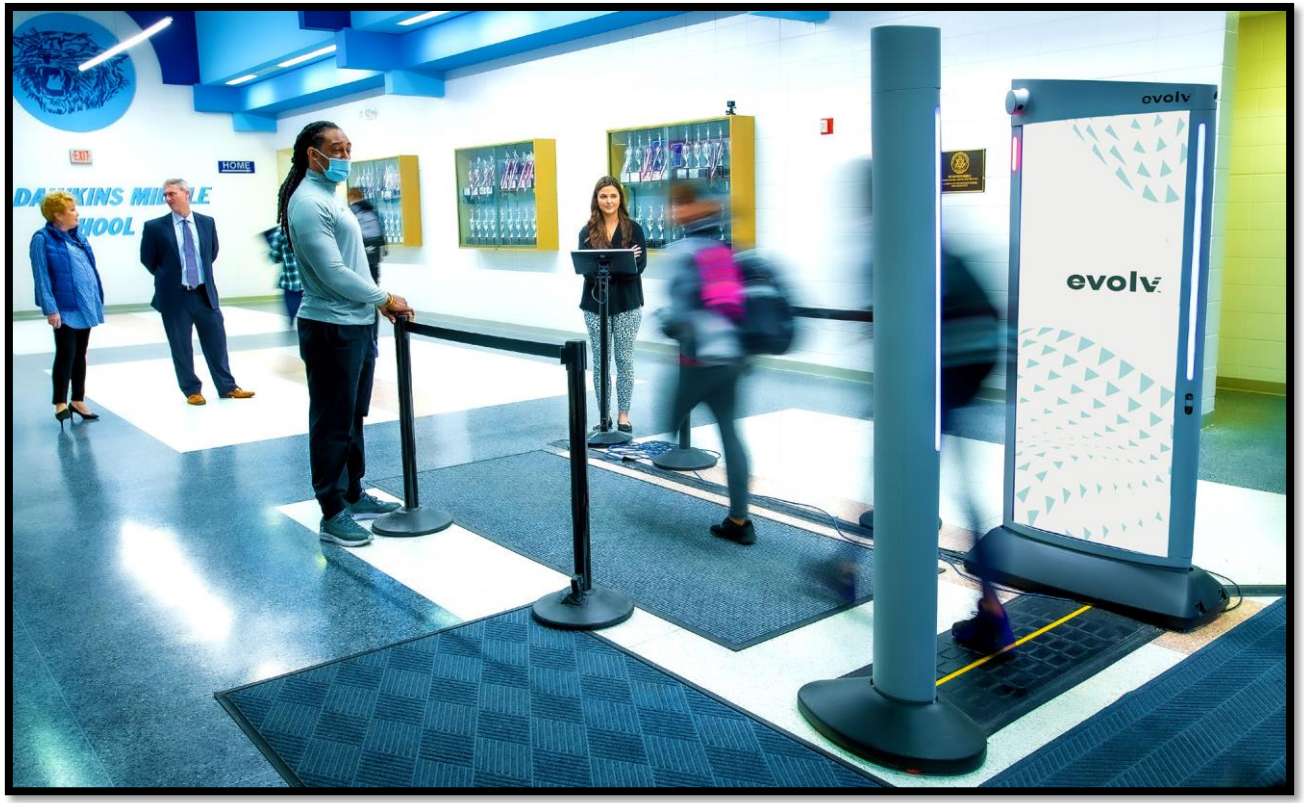
- Reports/articles of districts using cameras to catch kids not wearing masks
- Thermal imaging cameras to identify kids with fevers

Neither seem to be good ideas to me...

Passive Body Scanners

- **This spring, after an uptick in the number of guns confiscated from students, Charlotte-Mecklenburg schools introduced a different security system: walk-through weapon scanners that cost $5 million for 52 scanners at 21 high schools.**
- **The scanners come from Evolv Technology, a Massachusetts start-up that said it had used machine learning to train its system to recognize magnetic fields around guns and other concealed weapons. “No stopping is required,” the company’s website says, “no emptying pockets or removing bags.”**
- **But common student items have routinely set off the Evolv scanners, among them laptops, umbrellas, three-ring binders, spiral-bound notebooks and metal water bottles.**
- **In a how-to video about the scanners posted on YouTube in April, Matthew Garcia, dean of students at Charlotte-Mecklenburg’s Butler High School, recommended that students remove those objects from their bags and carry them. Then Mr. Garcia showed students how to avoid triggering the system — by walking through an Evolv scanner in the school lobby holding a laptop with his arms stretched above his head.**

Passive Body Scanners



Facial Recognition Software

- **Lockport City School District (New York)**
- **AEGIS System - $1.4 million for use on 300 cameras**
- **Looks for faces that match a "person of interest"**
  - Sex offenders
  - Restraining orders
  - Former employees banned from entering schools
- **Moratorium against its use by New York State Education Department**
- **Concerns about reliability, racial bias, use of funds, etc.**

Vehicle License Plate Recognition System

- Flock Safety – flocksafety.com
- Fulton County Schools in Georgia has invested in 220 cameras to monitor the parking lots of their schools. The cameras will read the license plates of cars that drive on campus; and "If someone comes on the school ground that is not allowed or banned for bringing a gun onto the school ground or something like that, it will alert our local law enforcement," said Paul Hildreth, with Fulton County Schools' Safety & Security Department.
- The City of Kenosha and Village of Pleasant Prairie, which make up the majority of our District's boundary, have both invested in a couple of dozen cameras, each for their properties, and are asking us to look into them.

Flock Safety's Automated License Plate Reading Camera

The first camera that sees like a detective.

7/10 crimes are committed with the use of a vehicle.
Capture the vehicle details you need to track leads and solve crime. Flock Safety's patented Vehicle Fingerprint™ technology lets you search by vehicle make, color, type, license plate, state of the license plate, missing plate, covered plate, paper plate, and unique vehicle details like roof racks, bumper stickers, and more.

POTENTIAL PITFALLS

- Data breaches and cyber crime
- Over-reliance on technology and forget importance of human factor, mental health initiatives, training and preparedness, school climate, etc.
- Don’t oversell the capabilities of technology in school security

THANK YOU

Any questions?

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