



DIXIE STATE UNIVERSITY
TRAILBLAZERS



CASE STUDY: Burns Arena

UniFi AC HD Propels High-Performance Event Wi-Fi in University Arena

Ubiquiti Networks® UniFi® AC HD APs maximize wireless performance in a high-density location

UniFi AC HD APs enables KINnect YOU to set world record for most memories uploaded and tagged

The UniFi PoE Switches provide robust switching and auto-sensing 802.3at PoE+

WORLD RECORD SET WITH UNIFI AC HD ACCESS POINTS

On March 25, 2017, KINnect YOU, a family history event for youths, was held at Burns Arena. As tracked by the Family Search Department of The Church of Jesus Christ of Latter-Day Saints, KINnect YOU set a world record during a 30-minute period: 18,563 memories uploaded and 12,111 memories tagged.

With almost 2000 participants simultaneously online at peak times, they consistently experienced upload and download speeds of 50+ Mbps. Each UniFi AC HD AP supported a maximum load of approximately 100 clients. The reduction in transmit power combined with proper aiming of the APs helped to balance out the client load.



Setting world record of memory uploads and tags

By the end of the event, over 300 gigabytes of data were transferred over the UniFi AC HD APs during an 8.5-hour span by approximately 3500 unique users.

"... everyone from the University said that normally the [previous] coverage could only handle wireless traffic from 200 - 300 people at one time. We had nearly 4000 people all using the Wi-Fi at the same time. It was amazing."

Dennis Leavitt, Founder and Organizer, KINnect YOU

SETTING THE STAGE

Covering southern Utah, southeastern Nevada, and a small part of Arizona, InfoWest is an Internet Service Provider (ISP) that provides broadband wireless, VoIP, fiber optic, and networking services to residential, business, and municipal markets. During the past decade, Utah Business Magazine has included InfoWest on its annual list of top 20 Internet providers.

Located in St. George, Utah, Dixie State University serves more than 9,000 students. Its Division II basketball teams compete in the M. Anthony Burns Arena, which offers almost 5,000 permanent seats in 43,000 square feet.

Burns Arena is an open space with tall metal beams, highly reflective surfaces, concrete, and minimal infrastructure for installation of wireless access points. It is also a high-density environment where thousands of people congregate in a relatively small space.

UNIFI NETWORK SOLUTION



UniFi AC HD APs mounted below catwalks



UniFi 16-Port PoE Switch supports multiple APs

UBIQUITI PRODUCT SELECTION

With an upcoming event requiring bandwidth-intensive application usage, Dixie State University and event organizers sought to improve the existing wireless network: two APs for the entire arena. Most proposals were significantly over budget.

InfoWest deploys Ubiquiti® airMAX® AC and airMAX products for broadband wireless and supports UniFi networks in a variety of locations, from housing complexes to parks. To satisfy performance and budgetary demands, InfoWest proposed a cost-effective yet permanent upgrade using UniFi products:

- 1 UniFi Security Gateway Pro, model USG-PRO-4
- 2 UniFi 24-Port PoE Switches, model US-24-500W
- 1 UniFi 16-Port PoE Switch, model US-16-150W
- 20 UniFi AC HD (High Density) APs, model UAP-AC-HD



Burns Arena hosting family history event for youths

“With 20 APs we were able to keep thousands of users online with good download and upload speeds (typically in the 50M+ range) throughout the event. Other vendors had recommended over 100 APs for the event at a much higher price (\$100,000 - \$200,000), with much lower expected performance.”

Randy Cosby, Vice President, InfoWest

WIRED DEPLOYMENT

Dixie State University accepted the proposal from InfoWest, and in early March 2017, InfoWest installed the UniFi network over two-and-a-half days using a crew of five.

The university’s backbone is gigabit fiber, which feeds into the UniFi Security Gateway Pro. Next in line is the UniFi 16-Port PoE Switch, which runs fiber to both UniFi 24-Port PoE Switches, one located on the north side of the arena and the other located on the south side. Each 24-port switch provides data and PoE to 10 UniFi AC HD APs and offers additional ports for future network growth.

The catwalks offered only 277VAC, so InfoWest installed standard AC outlets to power the switches and then creatively mounted the switches to the railings using beam clamps.

WIRELESS DEPLOYMENT

InfoWest selected the simultaneous dual-band UniFi AC HD APs for their technological advantage: they combine the performance increases from 802.11ac Wave 2 MU-MIMO technology and the use of 4x4 spatial streams to significantly increase multi-user throughput and overall user experience – vital for a live event.

Because the catwalks are used for a variety of lighting and sound schemes depending on an event’s needs, InfoWest had to mount the UniFi AC HD APs underneath the catwalks. They devised a custom bracket design to clamp an AP to a beam and added a safety lanyard as a preventive measure.

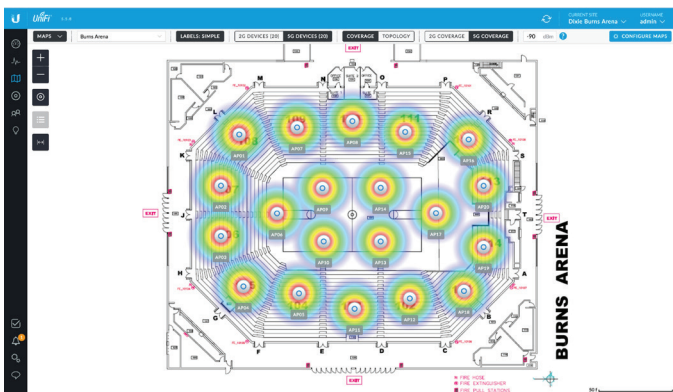
Although the installation locations were limited by the placements of the catwalks, the design was flexible enough so InfoWest could aim each individual UniFi AC HD AP towards a different section of the audience using a heat mapping software application. (The UniFi AC HD AP is designed to direct more energy downwards – especially useful for applications such as stadiums or concert venues.)





AP PLACEMENT ON MAP

The UniFi products are bundled with the UniFi Controller software, which manages UniFi devices through a web browser or the UniFi mobile app. The Map screen of the UniFi Controller shows the physical locations of all managed devices, which can be filtered by device type and radio band. InfoWest used the Map screen to show the placement of the UniFi AC HD APs in Burns Arena. The 5 GHz Coverage option displays the approximate 5 GHz coverage area of each AP.



Map screen depicting locations of UniFi AC HD APs

WIRELESS CONFIGURATION

InfoWest used the UniFi Controller software to optimize the AP configuration:

- All APs were set on non-overlapping channels of 20 MHz.
- Only three APs operate in the 2.4 GHz radio band to avoid channel overlap and noise.
- For the 5 GHz radio band, InfoWest set all of the APs on non-overlapping 5 GHz channels.
- For transmit power, 2.4 GHz APs were set to 6 dBm, and 5 GHz APs were set to 14 dBm. This better isolates client devices and spreads the load amongst the APs.
- Minimum RSSI was set to -80 dBm for all APs. If a client's signal strength falls below the minimum, then the AP drops the client, allowing it to reconnect with a more suitable AP.
- Airtime fairness was enabled to help multiple clients share the bandwidth of a single AP, so a single client cannot monopolize an AP.

NETWORK TRAFFIC MONITORING

At KINnect YOU, InfoWest used the UniFi Controller software to monitor how many users were online and which APs were serving the highest number of users. By enabling the Deep Packet Inspection (DPI) feature offered by the UniFi Security Gateway Pro, InfoWest also tracked which applications and clients were using the most bandwidth.



Dashboard screen of the UniFi Controller

“From a technological standpoint at all of our events including our sports, this technology allows us to use state-of-the-art marketing in real time with uploads and shares that will be an incredible change to our current system. We are installing big screen technology in the Burns as well and this will allow us to utilize uploads like selfies for contests and for crowd engagement. The Ubiquiti network makes this all possible.”

John Bowler, Development Officer, Dixie State University



UNIFI IN ACTION



Statistics > Overview screen of the UniFi Controller

UNIFI CONTROLLER SOFTWARE

The Statistics > Overview screen of the UniFi Controller shows a visual representation of the wireless clients and wireless network traffic during KINnect YOU as the number of clients and amount of traffic ramped up during the start of the event.

DEVICE NAME	IP ADDRESS	STATUS	POE CLIENTS	5G CLIENTS	TX	RX	TX SS	RX SS	TX SS CHANNEL	ACTIONS
AP01	192.168.1.17	Online	0	41	30.1 MB	5.32 MB			36 (60)	LOCK
AP02	192.168.1.18	Online	0	47	88.6 MB	406 MB			53 (60)	LOCK
AP03	192.168.1.20	Online	0	36	7.53 MB	2.85 MB			60 (60)	LOCK
AP04	192.168.1.12	Online	0	18	1.93 MB	7.76 MB			54 (60)	LOCK
AP05	192.168.1.24	Online	20	0	24.4 MB	1.71 MB			1 (1) (48 (60))	LOCK
AP06	192.168.1.4	Online	0	14	9.83 MB	2.83 MB			60 (60)	LOCK
AP07	192.168.1.9	Online	36	24	440 MB	46.3 MB			13 (1) (48 (60))	LOCK
AP08	192.168.1.10	Online	0	17	42.4 MB	2.39 MB			64 (60)	LOCK
AP09	192.168.1.23	Online	0	34	32.3 MB	15.7 MB			100 (60)	LOCK
AP10	192.168.1.26	Online	0	44	52 MB	2.48 MB			122 (60)	LOCK
AP11	192.168.1.15	Online	0	48	50 MB	18.4 MB			104 (60)	LOCK
AP12	192.168.1.29	Online	0	7	5.64 MB	302 KB			116 (60)	LOCK
AP13	192.168.1.13	Online	0	36	29 MB	3.07 MB			108 (60)	LOCK
AP14	192.168.1.11	Online	0	42	26.1 MB	46.2 MB			120 (60)	LOCK
AP15	192.168.1.14	Online	0	28	12.8 MB	1.55 MB			128 (60)	LOCK
AP16	192.168.1.17	Online	0	10	1.28 MB	307 KB			127 (60)	LOCK
AP17	192.168.1.21	Online	24	9	12.8 MB	1.05 MB			4 (1) (48 (60))	LOCK
AP18	192.168.1.16	Online	0	8	2.81 MB	142 KB			136 (60)	LOCK
AP19	192.168.1.7	Online	0	7	309 KB	26.1 KB			133 (60)	LOCK
AP20	192.168.1.12	Online	0	8	1.61 MB	300 KB			141 (60)	LOCK

Devices > APs > Performance screen of the UniFi Controller

The Devices screen is filtered to display only the 20 UniFi AC HD APs of Burns Arena. The Performance option displays each AP's status information: the number of 2.4 and 5 GHz clients, overall transmit rate, overall receive rate, 2.4 and 5 GHz transmit rates, and channel setting.



UniFi AC HD AP mounted near arena lighting



Dashboard of the UniFi Mobile app

PLANS FOR THE FUTURE

At Burns Arena, the UniFi PoE Switches have open ports available for future network expansion in anticipation of increasing bandwidth demands.

"We used an app at KINnect YOU that captured everyone's cell phone so that they could watch a presentation right on their phone that your network made possible because we could have everybody on at the same time. These kinds of applications are just in their infancy for us. We will have lots more promotions of the Burns Arena and the events."

John Bowler, Development Officer, Dixie State University

For smaller universities and schools that often cannot afford the typically high-priced, high-end wireless equipment; InfoWest will propose an attractive alternative using UniFi solutions: premium wireless coverage combined with excellent price/performance value. InfoWest will also continue to deploy the UniFi AC HD APs in high-density applications, such as hotels and public spaces.

"We are proposing similar networks for other university arenas in the region... The UniFi AC HD AP is our primary product for future high-density usage cases like this."

Randy Cosby, Vice President, InfoWest

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