CASE STUDY

Public Venues

SUNDANCE FILM FESTIVAL

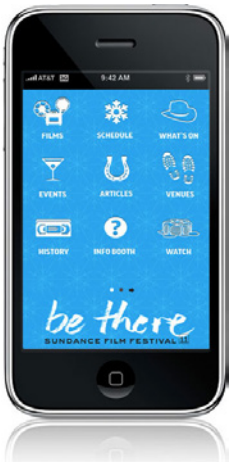
Sundance Tackles High User Density and Cellular Offload with Smarter Wi-Fi for 50,000+ Moviegoers

When 50,000+ people hit Park City, Utah at the same time, all wireless hell breaks loose. Just ask the Sundance Institute, the organizers of the largest independent film festival in the United States: the Sundance Film Festival (Sundance).

Last year, Sundance saw the local 3G cellular network come to a standstill as tens of thousands of patrons tried to connect to the Internet. With more and more moviegoers coming to Sundance armed with powerful smart phones, iPads and other wireless-enabled devices, Sundance knew that in 2011 it needed to make some big changes.

The largest independent film festival in the United States, Sundance needed an industrial-strength wireless infrastructure that could cope with huge numbers of concurrent Wi-Fi clients.

"Over 50 percent of festival attendees have an average income of over $100,000 so you can imagine the kinds of people and their expectation for high speed connectivity," said Justin Simmons, Associate Director of IT for the Sundance Film Festival. "Last year, we couldn't even make calls using the 3G network and even when we could, the data rates were horrendous. This year our goal was to use Wi-Fi everywhere to enhance the user experience at the festival. So we went looking for an industrial-strength solution that could deliver high-performance, reliability and range within high-density user environments."



Sundance's 2011 iPhone/Android app was one of the major drivers for a smarter Wi-Fi system.

Sundance had never really provided Wi-Fi before as a festival service. Their goal was simple but their requirements were complex: provide multimedia-capable hotspot services to thousands of festival participants in a dozen different venues in Park City, Utah.

A primary driver for consistent Wi-Fi coverage and performance was Sundance's own iPhone/Android application that gave festival goers a myriad of information and news about the proceedings - from movie trailers and film guides to bus schedules and background on everything.

With a limited budget and sparse staff already responsible for every IT duty imaginable, Sundance needed a Wi-Fi system that was easy and flexible to deploy but powerful enough to cope with constantly changing RF conditions and high volumes of simultaneous users. Sundance needed to outfit each location with high-capacity access points (APs) that could be deployed with or without Ethernet connections - both indoors and outdoors.

"We realized that a high-capacity Wi-Fi solution is much more than simply how many clients can use a given AP at any one time," said Simmons. "It's about how the system can automatically manage and arbitrate the

COMPANY OVERVIEW

The largest independent film festival in the United State, the Sundance Film Festival is one of the most popular annual 10-day events in the world, attracting more than 50,000 moviegoers to Park City, Utah. Sundance is the premier showcase for new work from American and international independent filmmakers.

REQUIREMENTS

- Deploy stable and high-speed Wi-Fi in 12 dispersed high-capacity venues
- Offload data traffic from 3G network
- Support for streaming multimedia
- Support for a large number of concurrent users at each location
- Centralized management for all indoor and outdoor APs
- Simple administration and deployment
- High-data rates/strong Wi-Fi signals
- Remote troubleshooting and diagnostics

SOLUTION

- 20 ZoneFlex 7762 dual-band 802.11n outdoor Smart Wi-Fi APs
- 15 ZoneFlex 7962 dual-band 802.11n indoor Smart Wi-Fi APs
- 5 ZoneFlex 7363 dual-band 802.11n indoor Smart Wi-Fi APs
- 2 ZoneFlex 7731 point-to-point 802.11n outdoor wireless bridges
- ZoneDirector 3100 WLAN controller
- FlexMaster Wi-Fi management system

BENEFITS

- Festival-wide wireless connectivity
- All clients able to connect at the highest data rates with strong signals
- Support of high-density user environment using Beamforming, bandsteering and airtime fairness
- Data traffic offload from 3G network
- Stable connectivity due to interference mitigation
- Centralized (out of datapath) management for entire WLAN

Ruckus WIRELESS

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"With so many users in one place at one time, the 3G network just couldn't handle the flood of data traffic being presented to it.

This year, we made a strategic decision to use the best dual-band 802.11n Wi-Fi we could find to fix this problem.

Ruckus was the only supplier we found that had a comprehensive approach to solving highly dense user environments by addressing both spectrum management and user traffic controls."

Justin Simmons
Associate Director of IT
Sundance Film Institute

shared RF spectrum. So our interest was finding technology designed to cope with such conditions in an intelligent manner."

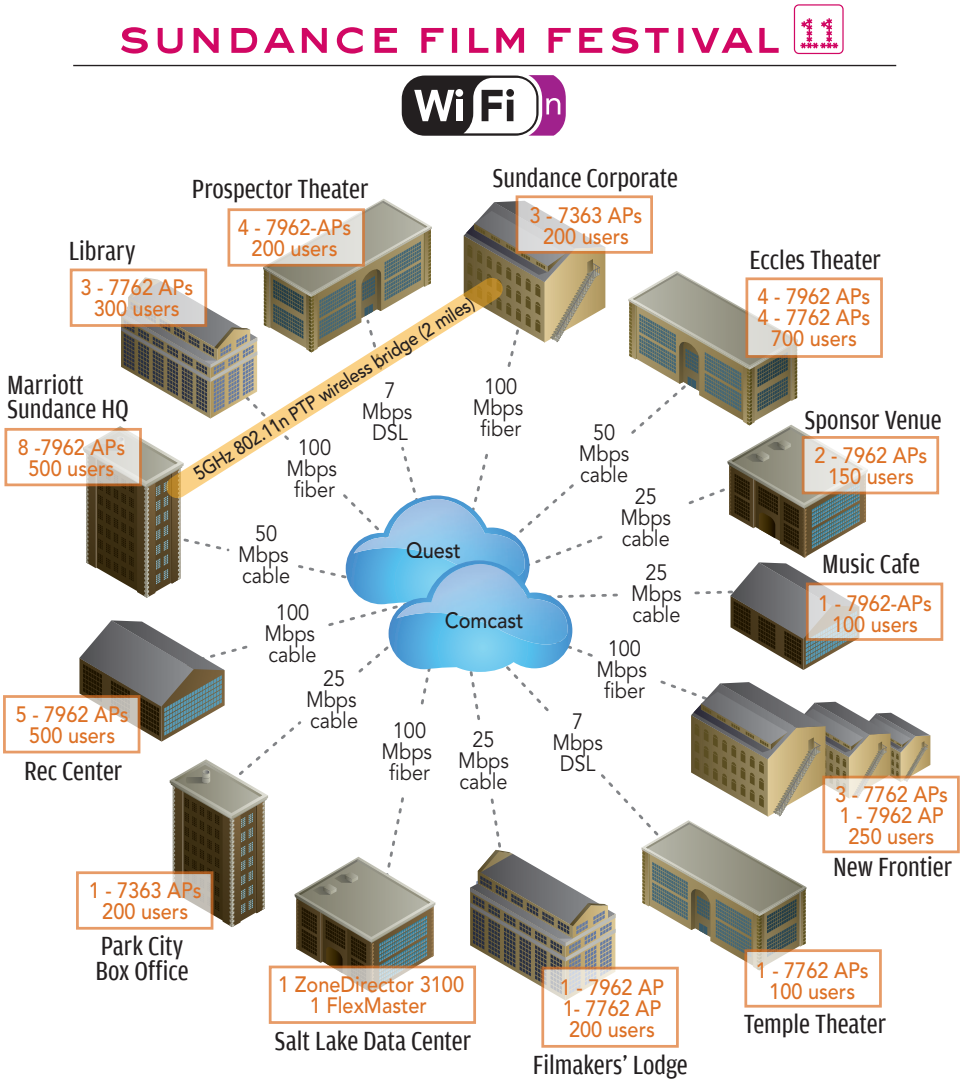
Because of the limited staff and geographically dispersed nature of the network, Sundance needed to manage and control all indoor and outdoor APs under the same management construct. The Wi-Fi system also needed to provide different service levels for different user groups such as public access, press, VIPs and Sundance staff.

Because handheld smart phones represent the majority of devices on the network, Sundance was interested in finding a Wi-Fi system that provided exceptional receive capabilities and one that could adapt to the changing antenna orientations of the client devices as people move around.

"One of the things we've found is that these smart phones have very weak and poorly implemented Wi-Fi capabilities," said Nichols. "So it was important to deploy a Wi-Fi system that could hear the weak signals from these devices and alter the polarization of Wi-Fi signals as people move their phones around. One of the things people don't realize is that when the orientation of the end device changes, the performance does too. We needed to account for this."

After evaluating a number of Wi-Fi suppliers, Sundance selected the Ruckus Wireless ZoneFlex 802.11n system. "Ruckus had the widest mix of indoor and outdoor products, all with integrated smart antennas that provide the reliability and range we needed - along with the central management that was brain dead simple to use. We just couldn't find the same set of capabilities with any other vendor," said Simmons.

Working with its integrator, Cinergy Wi-Fi, Sundance began deploying indoor and outdoor dual band 802.11n APs across all of its festival locations.



RIGHT:
The Sundance Smart Wi-Fi network spanned over 12 locations combining indoor and outdoor 802.11n access points, long range 802.11n bridges, a single, WLAN controller centralized in Sundance's data center facilities in Salt Lake City and remote management Wi-Fi software.

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"In the first 24 hours after turning up the Ruckus Wi-Fi network we saw hundreds of gig of traffic flow over the network.

More importantly, clients were able to connect at the highest data rates and saw strong signal strength on both 2.4 and 5Ghz at -46dB and -53dB respectively.

The ZoneFlex system delivered the most solid performance at range than we've ever seen in any Wi-Fi gear."

David Nichols
Senior Network Admin
Sundance Film Festival

Outdoor APs were wired or meshed and provided access to users in tents waiting for the next show. Sundance used a variety of dual band APs from the ZoneFlex 7363 for smaller locations to the ZoneFlex 7962 system for larger venues. Outdoors, the ZoneFlex 7762 was used.

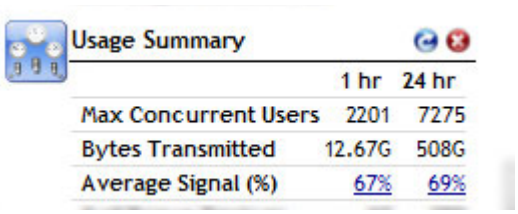
To connect each remote WLAN, Sundance used fiber, DSL, cable and wireless backbone links ranging from 5 to 100 Mbps. They also worked with AT&T to bring in several mobile cell towers. Sundance also deployed the ZoneFlex 7731, a long range, 5GHz, 802.11n bridge to connect Festival headquarters to its corporate offices two miles away. Sundance staff traffic was sent over this link.

A centralized ZoneDirector 3100 controller was installed in Sundance's data center 40 miles away in Salt Lake City eliminating the need to deploy controllers at each site. With a distributed forwarding architecture each venue's APs sent client data directly to the Internet without having to backhaul all the data through the controller 40 miles away.

FlexMaster, an advance remote Wi-Fi system management tool, gave Sundance essential reporting and statistical information on the network and its performance.

In the first 24 hours of deployment, the Sundance Wi-Fi network transmitted over 500 Gb of traffic and 12 Gb per hour with clients being able to access the network at the highest connection rates their devices could support. On average, signal strength averaged -67dB or better at all locations.

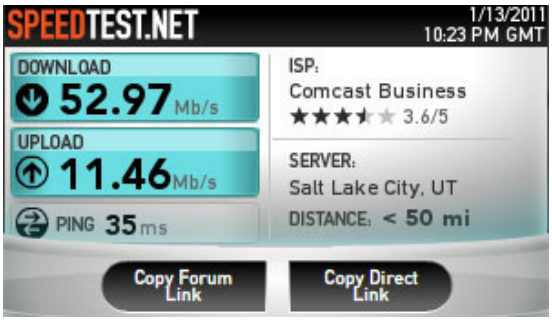
With the Ruckus gear, Sundance enabled a number of capabilities to support the high-capacity environment. This included the use of automatic bandsteering to force dual-band capable clients to less congested channels, airtime fairness, bandwidth thresholds per SSID and setting IP address lease times to 30 minutes.



DEALING WITH DENSITY
What to do

1. Use Wi-Fi gear supporting dynamic beamforming and interference rejection that minimizes packet loss by steering traffic around interference/ obstacles so clients get on and off the network faster
2. Enable bandsteering to direct dual-band capable clients to less congested 5GHz channels
3. Enable airtime fairness to give clients equal and fair access to the RF spectrum
4. Use AP client load balancing to ensure no single AP is overloaded by a large number of concurrent connections
5. Limit user bandwidth thresholds for public access SSID
6. Set IP lease limits to 30 minutes to ensure idle connections don't stop others from obtaining network access

BELOW:
Sundance users were able to connect at the highest data rates in each of the 12 locations with an average signal strength of -67dBi or better.



LEFT:
A screen capture from the Ruckus ZoneDirector 3100 controller shows over 12 Gb of traffic per hour with more than 500 gig of bytes transmitted within the first 24 hours of the network going live.

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