Vivato Switch Evaluation

This is a description of the evaluation process of the Vivato Switch and mainly deals with coverage area. We were looking for a way to get connectivity for certain problem areas on campus.

Scenario 1) Fisher Lecture Hall
This building is shaped like two triangles with the tops cut off and then connected together. This double thick wall proves to be a burden for other devices. No windows and a wall between the Vivato panel and all seats. This building is approximately 11,400 sq. ft. Below is a picture that shows the AP placement versus the Vivato placement.

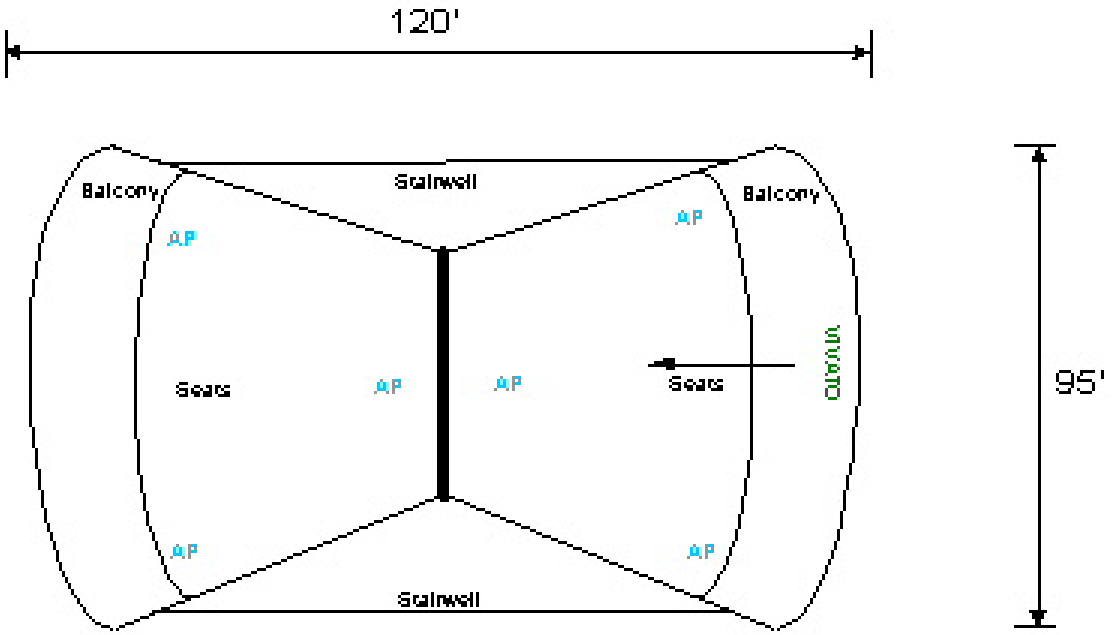

Fig. 1 Fisher AP Placement

Regular AP installation:
This would consist of us running conduit from the central node room to the 3 AP's and then run another around the outside of the building and then back in to setup a secondary node closet on the opposite side of the building. This outside conduit would have fiber, as the connection is more than 350'. Cost:

The second choice would be to run 4 conduits 3 for AP's and the 4th for a dedicated bridge. This proves to be inefficient as it uses one of the available channels and would mean that we would have to go to a 4-channel cluster. Approximate cost:

Vivato Solution:
This would consist of installing the Vivato switch in the existing node closet. This saves man-hours for the installation, upkeep of 6 or 8 individual devices, network cables and conduit to the devices, individual mounting areas for each device (custom boxes for installation),

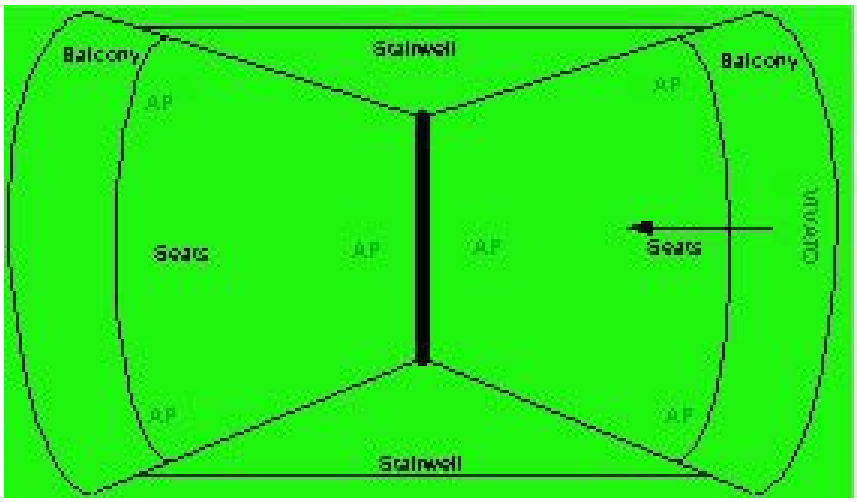

Fig. 2 Fisher Vivato Coverage

NOTES:
This installation has to accommodate a specific number of users. These two rooms hold 248 users each. For general coverage (not concerned with number of users) this requires 3 AP's per side (6 total). It would still take additionally 7APs to reach the same number of users the one Vivato Switch can accommodate.

Scenario 2) Landis Green:
This is an open green space area where people can sit and work on documents or even play games. Below is a picture that shows the AP placement versus the Vivato placement.

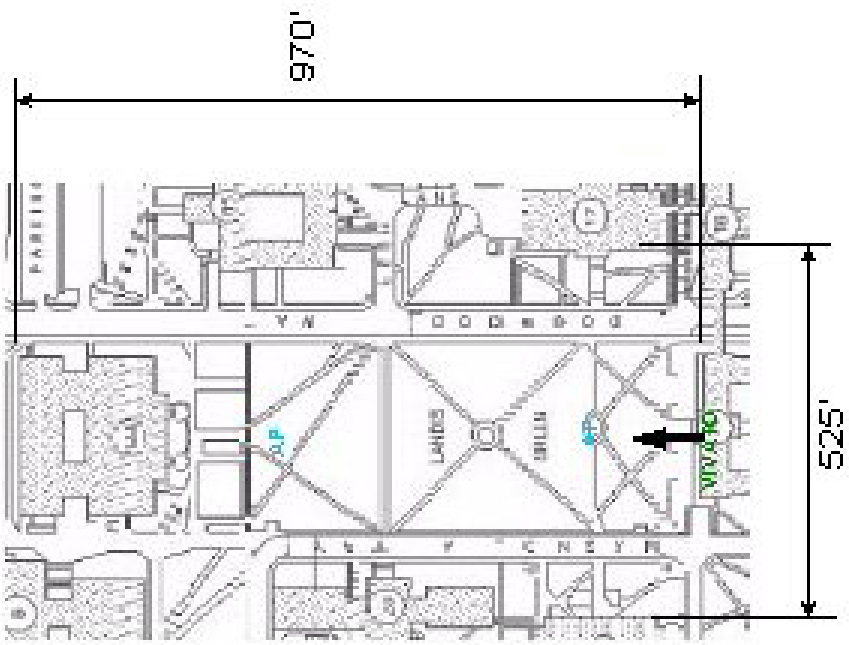

Fig. 3 Landis AP Placement

Regular AP installation:
Consists of installing two pedestals, one at each end of the green space about 1/3 the distance. This would provide basic coverage throughout the green space. This would have to have conduit pulled from the closest building to each pedestal location along with power. The pedestal would have to be a NEMA enclosure due to weather.

Vivato Solution:
This would consist of finding a building at the end of the green and installing the Vivato switch. This would require two conduits, Ethernet cable, and power. This is covering approximately 509,250 sq. ft.

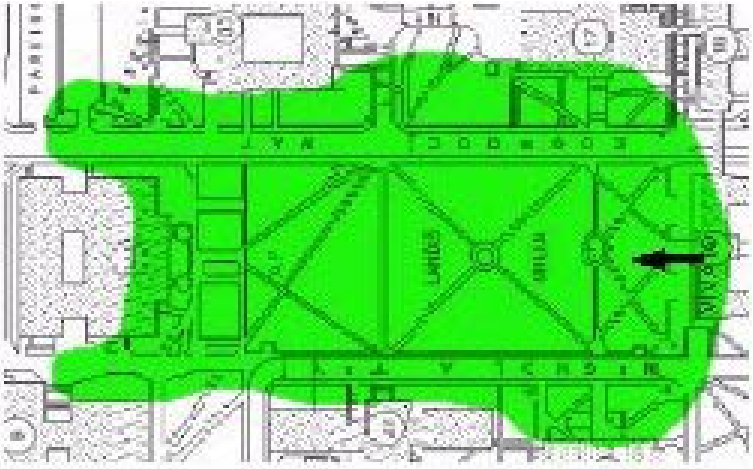

Fig 4. Landis Vivato Coverage

NOTES:
This is an expensive installation, as two pedestals would have to be constructed for the APs. For the same number of users the Vivato panel can accommodate it would take 11 APs.

Scenario 3) Shores Library
This building has a self-supporting floor thus the floors are about 2 feet thick with I-beam construction. This is a 3-story library building with the bottom floor partially underground. This building has no supporting walls but does have a 2' thick flooring structure with cross I-beams. Below is a picture of the AP placement.

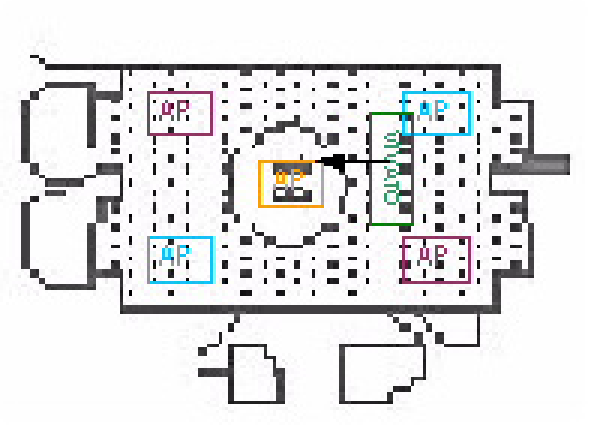

Fig. 5 Shores AP Placement

Regular AP Installation:
This building would need a minimum of 5 APs, 2 on the basement floor one on the 1st and 2 on the 2nd and would allow very little floor penetration but enough to cover the area.

Vivato Solution:
This would consist of placing one Vivato Switch on the basement floor and one on the second floor. This would be full building coverage.

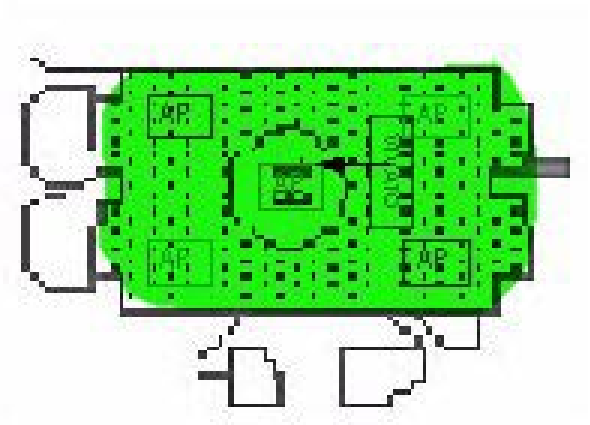

Fig. 6 Shores Vivato Basement Coverage

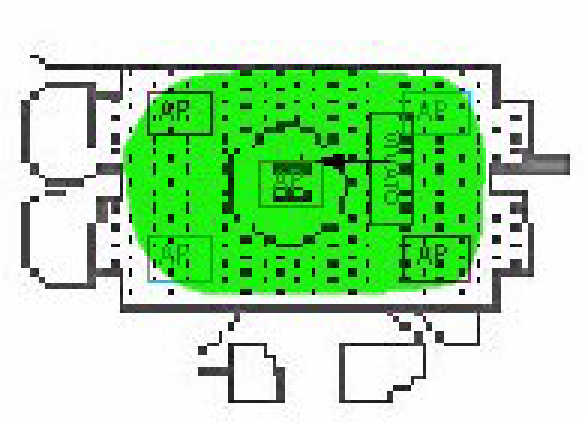

Fig. 7 Shores Vivato 1st Floor Coverage

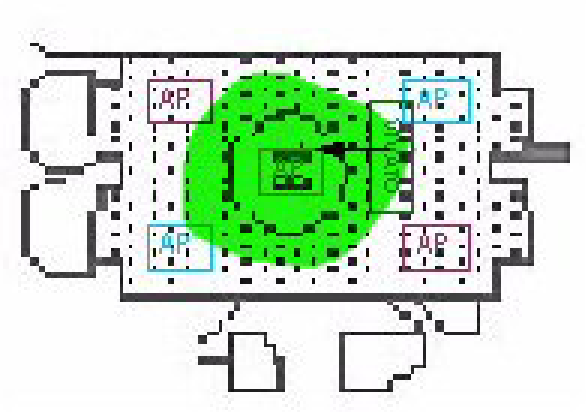

Fig. 8 Shores Vivato 2nd Floor Coverage

NOTES:

This installation shown (Fig. 5) is more of a general coverage installation. There are no more than two APs per floor. The blue APs would be on the basement floor with the center AP (orange) covering a small section on the 1st floor and the other APs (purple) are on the 2nd floor. If you look at this type of installation as cylinders going straight up and down/floor most floor coverage is accomplished. The Vivato installation however does a very good job of covering the whole building with just one Switch. For full coverage of this building we would actually use 2 Vivato Switches. In comparing the single switch solution it would still take another 9 APs to get the same number of users as the single Vivato Switch and in comparing the 2 Switch solution would require an additional 13 (total of 22 APs). With the Vivato Switch we are using the “back pattern” as part of our coverage on the basement and 1st floor (great use of the signals but you must be sure to do proper test).

Scenario 4) Sliger purposely left out

Scenario 5) Stadium
Like most large open air space, it is hard to provide coverage in such an area. The main problem is that there is no place to install most access points without a complete retro-fit. Below is a picture that shows the AP placement versus the Vivato placement.

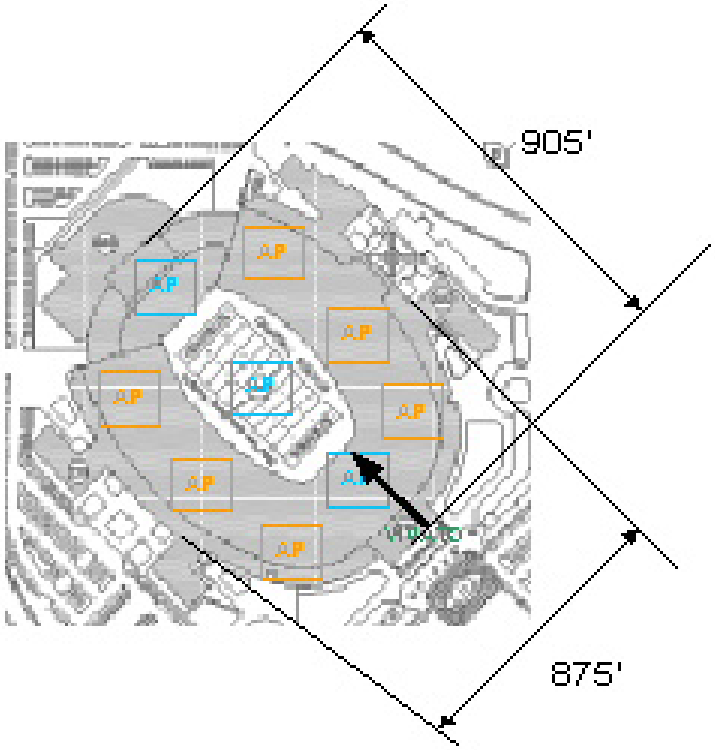

Fig. 11 Stadium AP Placement

Regular AP Installation:
This installation would consist of placing APs in an indoor location with antenna that would get coverage into the stadium seating. This would be a tricky installation to say the least.

Vivato Solution:
This installation would be placed on a wall just inside one of the restaurants. This location already has power and would only need a network connection.

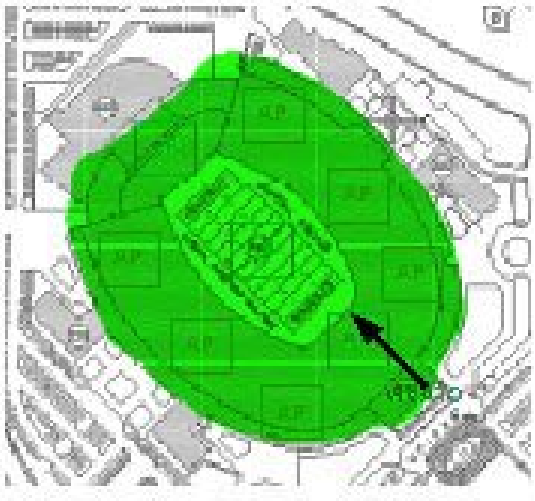

Fig 12 Stadium Vivato Coverage

NOTES:
The Vivato solution requires only a single device. To just span the distance would require 3 APs as listed in Fig. 11 (blue) and to cover the whole stadium would require another 6 (orange). This is a total of 9 APs. Our belief is that it would still require an additional 4 APs to accommodate the same number of users as the single Vivato Panel.

This chart shows dollar amounts for each installation based upon using a regular AP.

	AP Costs	Conduit $187 per AP	Ethernet $182 per AP	Switch Ports $150 per AP	Maintenance $75/AP	Total per Location	Expected # of Users
Fisher (6)	$ 9,000.00	$ 1,122.00	$ 1,092.00	$ 900.00	$ 450.00	$ 12,564.00	120
Landis (3)*	$ 3,000.00	$ 561.00	$ 546.00	$ 450.00	$ 225.00	$ 4,782.00	60
Shores (5)	$ 7,500.00	$ 935.00	$ 910.00	$ 750.00	$ 375.00	$ 10,470.00	100
Sliger (2)	$ 3,000.00	$ 374.00	$ 364.00	$ 300.00	$ 150.00	$ 4,188.00	40
Stadium (9)	$13,500.00	$ 1,683.00	$ 1,638.00	$ 1,350.00	$ 675.00	$ 18,846.00	180
Subtotal	$36,000.00	$ 4,675.00	$ 4,550.00	$ 3,750.00	$ 1,875.00		

* NOTE: This installation actually requires two pedestals, one at each end of the open green area, which would also need power and fiber. This would add an additional $25,000.00 to the cost.

This chart shows dollar amounts for each installation based upon using the Vivato Switch.

	Vivato Costs	Conduit $187 per AP	Ethernet $182 per AP	Switch Ports $150 per AP	Maintenance $75/Switch	Total per Location	Expected # of Users
Fisher	$ 9,000.00	$ 187.00	$ 182.00	$ 150.00	$ 75.00	$ 9,594.00	260
Landis	$ 9,000.00	$ 187.00	$ 182.00	$ 150.00	$ 75.00	$ 9,594.00	260
Shores (1)	$ 9,000.00	$ 187.00	$ 182.00	$ 150.00	$ 75.00	$ 9,594.00	260
Shores (2)	$18,000.00	$ 374.00	$ 364.00	$ 300.00	$ 150.00	$ 19,188.00	520
Sliger	$ 9,000.00	$ 187.00	$ 182.00	$ 150.00	$ 75.00	$ 9,594.00	260
Stadium	$ 9,000.00	$ 187.00	$ 182.00	$ 150.00	$ 75.00	$ 9,594.00	260
Subtotal	$63,000.00	$ 1,309.00	$ 1,274.00	$ 1,050.00	$ 525.00		

This chart shows the difference in both prices.

	Difference
Fisher	$ (2,970.00)
Landis	$ 4,812.00
Shores	$ (876.00)
Sliger	$ 5,406.00
Stadium	$ (9,252.00)

This chart shows the price to get what we believe to be the same number of users as the Vivato Switch with regular APs.

	AP Costs For Same Number of Users	Conduit $187 per AP	Ethernet $182 per AP	Switch Ports $150 per AP	Maintenance $75/Switch	Total per Location
Fisher	$19,500.00	$ 2,431.00	$ 2,366.00	$ 1,950.00	$ 975.00	$ 27,222.00
Landis	$19,500.00	$ 2,431.00	$ 2,366.00	$ 1,950.00	$ 975.00	$ 27,222.00
Shores (1)	$19,500.00	$ 2,431.00	$ 2,366.00	$ 1,950.00	$ 975.00	$ 27,222.00
Shores (2)	$39,000.00	$ 4,862.00	$ 4,732.00	$ 3,900.00	$ 1,950.00	$ 54,444.00
Sliger	$19,500.00	$ 2,431.00	$ 2,366.00	$ 1,950.00	$ 975.00	$ 27,222.00
Stadium	$19,500.00	$ 2,431.00	$ 2,366.00	$ 1,950.00	$ 975.00	$ 27,222.00

This chart shows the difference from the price of the Vivato Switch and the regular AP price for the same number of users.

	Difference
Fisher	$ 17,628.00
Landis	$ 17,628.00
Shores (1)	$ 17,628.00
Shores (2)	$ 35,256.00
Sliger	$ 17,628.00
Stadium	$ 17,628.00