

Building interoperability & Why you can't/shouldn't live without it.

Kenny Seeton Plant Manager/Energy Manager Central Plant www.csudh.edu/sustainability

CALIFORNIA STATE UNIVERSITY, DOMINGUEZ HILLS



Welch Hall energy savings: LED smart lighting connected to BAS



Built 2002 4 story 179,222 sq'



Lighting Zones to match VAV Zones

Granular Control of HVAC





BAS BACnet device discovery

Discovery Complete

🗾 Wizard Auto Detect Utility

Status

Stop Restart Close Results are from a previous discovery.

Native Object Name	Identifier	Name	Instance Number	Remote Network Addr	Vendor Name
Versa_IC_1	Device-80002	Versa_IC_1	80002	172.16.16.68	FieldServer Technologie 📥
MP200Y_2	Device-50002	MP200Y_2	50002	00:00:00:00:c3:52	FieldServer Technologie
Shark_200_4	Device-50004	Shark_200_4	50004	00:00:00:00:c3:54	FieldServer Technologie
MP200Y_1	Device-50001	MP200Y_1	50001	00:00:00:00:c3:51	FieldServer Technologie
Shark_200_3	Device-50003	Shark_200_3	50003	00:00:00:00:c3:53	FieldServer Technologie
CSUDH/WH_Welch Hall/Welch Hall/WH 2nd Floor/WHEN2.40[240]	Device-2135240	CSUDH/WH_Welch Hall/WH 2nd Floor/WHEN2.40[240]	2135240	10:11:23:10	Enlighted Inc.
CSUDH/WH_Welch Hall/Welch Hall/WH 2nd Floor/WHEN2.37[237]	Device-2135237	CSUDH/WH_Welch Hall/Welch Hall/WH 2nd Floor/WHEN2.37[237]	2135237	10:11:23:05	Enlighted Inc.
CSUDH/WH_Welch Hall/Welch Hall/WH 2nd Floor/WHEN2.35[235]	Device-2135235	CSUDH/WH_Welch Hall/WH 2nd Floor/WHEN2.35[235]	2135235	10:11:23:03	Enlighted Inc.
CSUDH/WH_Welch Hall/Welch Hall/WH 2nd Floor/WHEN2.43[243]	Device-2135243	CSUDH/WH_Welch Hall/Welch Hall/WH 2nd Floor/WHEN2.43[243]	2135243	10:11:23:13	Enlighted Inc.
CSUDH/WH_Welch Hall/Welch Hall/WH 2nd Floor/WHEN2.39[239]	Device-2135239	CSUDH/WH_Welch Hall/WH 2nd Floor/WHEN2.39[239]	2135239	10:11:23:07	Enlighted Inc.
CSUDH/WH_Welch Hall/Welch Hall/WH 2nd Floor/WHEN2.33[233]	Device-2135233	CSUDH/WH_Welch Hall/WH 2nd Floor/WHEN2.33[233]	2135233	10:11:23:01	Enlighted Inc.
CSUDH/WH_Welch Hall/Welch Hall/WH 2nd Floor/WHEN2.46[245]	Device-2135245	CSUDH/WH_Welch Hall/Welch Hall/WH 2nd Floor/WHEN2.46[245]	2135245	10:11:23:15	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z54-A230[407]	Device-2109407	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z54-A230[407]	2109407	10:02:77:37	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z53-A228[406]	Device-2109406	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z53-A228[406]	2109406	10:02:77:36	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z52-A224[405]	Device-2109405	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z52-A224[405]	2109405	10:02:77:35	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z51-A222[404]	Device-2109404	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z51-A222[404]	2109404	10:02:77:34	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z50-D203, D205[403]	Device-2109403	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z50-D203, D205[403]	2109403	10:02:77:33	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z49-B207[402]	Device-2109402	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z49-B207[402]	2109402	10:02:77:32	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z48-B209[401]	Device-2109401	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z48-B209[401]	2109401	10:02:77:31	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z47-A202, A202A, A202B[400]	Device-2109400	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z47-A202, A202A, A202B[400]	2109400	10:02:77:30	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z45_Z46-A204 Auditorium[398]	Device-2109398	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z45_Z46-A204 Auditorium[398]	2109398	10:02:77:26	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z44-C202, C204[397]	Device-2109397	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z44-C202, C204[397]	2109397	10:02:77:25	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z43-B203[396]	Device-2109396	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z43-B203[396]	2109396	10:02:77:24	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z42-C205[395]	Device-2109395	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z42-C205[395]	2109395	10:02:77:23	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z41-A229[394]	Device-2109394	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z41-A229[394]	2109394	10:02:77:22	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z40-A227[393]	Device-2109393	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z40-A227[393]	2109393	10:02:77:21	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z39-A225[392]	Device-2109392	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/Z39-A225[392]	2109392	10:02:77:20	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/delete4[399]	Device-2109399	CSUDH/LCH_LaCorte Hall/LaCorte Hall/2nd Floor/delete4[399]	2109399	10:02:77:27	Enlighted Inc.
CSUDH/SBS and EAC/SBS/1st/VAV 1-6 RM B143[599]	Device-2117599	CSUDH/SBS and EAC/SBS/1st/VAV 1-6 RM B143[599]	2117599	10:04:77:37	Enlighted Inc.
CSUDH/SBS and EAC/SBS/1st/VAV 1-5 RM A144[594]	Device-2117594	CSUDH/SBS and EAC/SBS/1st/VAV 1-5 RM A144[594]	2117594	10:04:77:32	Enlighted Inc.
CSUDH/SBS and EAC/SBS/1st/VAV 1-4 RM A144A[598]	Device-2117598	CSUDH/SBS and EAC/SBS/1st/VAV 1-4 RM A144A[598]	2117598	10:04:77:36	Enlighted Inc.
CSUDH/SBS and EAC/SBS/1st/VAV 1-3 RM B137[597]	Device-2117597	CSUDH/SBS and EAC/SBS/1st/VAV 1-3 RM B137[597]	2117597	10:04:77:35	Enlighted Inc.
CSUDH/SBS and EAC/SBS/1st/VAV 1-2 RM B131[596]	Device-2117596	CSUDH/SBS and EAC/SBS/1st/VAV 1-2 RM B131[596]	2117596	10:04:77:34	Enlighted Inc.
CSUDH/SBS and EAC/SBS/1st/VAV 1-1 RM F101-A134[595]	Device-2117595	CSUDH/SBS and EAC/SBS/1st/VAV 1-1 RM F101-A134[595]	2117595	10:04:77:33	Enlighted Inc.
CSUDH/I and I/I and I/Floor 3/VAV3.9[624]	Device-2139624	CSUDH/I and I/I and I/Floor 3/VAV3.9[624]	2139624	10:12:27:50	Enlighted Inc.
CSUDH/I and I/I and I/Floor 3/VAV3.4[623]	Device-2139623	CSUDH/I and I/Floor 3/VAV3.4[623]	2139623	10:12:27:47	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z14_Z15-A106[365]	Device-2108365	CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z14_Z15-A106[365]	2108365	10:02:57:15	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z1-A105,107[352]	Device-2108352	CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z1-A105,107[352]	2108352	10:02:57:00	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z4-A110,112,114,116[355]	Device-2108355	CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z4-A110,112,114,116[355]	2108355	10:02:57:03	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z16-C104[367]	Device-2108367	CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z16-C104[367]	2108367	10:02:57:17	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z12-A107 Gallery West[363]	Device-2108363	CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z12-A107 Gallery West[363]	2108363	10:02:57:13	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z11-A115[362]	Device-2108362	CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z11-A115[362]	2108362	10:02:57:12	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z10-A118,A118A,D103A[361]	Device-2108361	CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z10-A118,A118A,D103A[361]	2108361	10:02:57:11	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z9-A115A[360]	Device-2108360	CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z9-A115A[360]	2108360	10:02:57:10	Enlighted Inc.
CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z8-D103[359]	Device-2108359	CSUDH/LCH_LaCorte Hall/LaCorte Hall/1st Floor/Z8-D103[359]	2108359	10:02:57:07	Enlighted Inc. 🥃

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Tailored Summary Summary Available Tailored Summaries —

VAV Summary Tech View

VAV summary screen

	Zone Temp	Zone Setpoint	Reheat Valve	Discharge Air Temp	 Damper Position 	Supply Flow	Supply Flow Setpoint	
4-2R	72.9 deg F	72.0	0 %	59.0 deg F	100 %	409.5 cfm	1,425.0 cfm	
4-15R	72.7 deg F	72.0	0 %	58.4 deg F	100 %	314.5 cfm	781.5 cfm	
4-16R	70.8 deg F	72.0	54 %	59.9 deg F	100 %	384.6 cfm	375.0 cfm	
4-24R	74.7 deg F	72.0	0 %	59.7 deg F	100 %	240.0 cfm	900.0 cfm	
4-29R	75.1 deg F	72.0	0 %	??? -80.1 deg F	100 %	197.5 cfm	400.0 cfm	
4-58R	73.1 deg F	72.0	0 %	59.8 deg F	100 %	671.5 cfm	725.0 cfm	
4-13R	74.5 deg F	72.0	1 %	58.5 deg F	100 %	116.0 cfm	1,050.0 cfm	
4-6R	71.9 deg F	72.0	0 %	59.2 deg F	59 %	111.8 cfm	108.0 cfm	
4-11R	71.5 deg F	72.0	11 %	58.3 deg F	83 %	517.8 cfm	500.0 cfm	
4-43R	71.1 deg F	72.0	16 %	60.6 deg F	59 %	490.0 cfm	475.0 cfm	
4-31R	72.3 deg F	72.0	1 %	60.1 deg F	52 %	503.1 cfm	498.7 cfm	
4-14R	71.5 deg F	72.0	9 %	58.3 deg F	46 %	459.9 cfm	450.0 cfm	
4-45R	70.2 deg F	70.0	1 %	61.3 deg F	43 %	304.0 cfm	300.0 cfm	
4-60R	72.7 deg F	72.0	0 %	59.7 deg F	40 %	290.6 cfm	282.4 cfm	
4-19R	71.3 deg F	72.0	47 %	67.2 deg F	35 %	154.1 cfm	150.0 cfm	
4-5R	73.4 deg F	74.0	43 %	63.3 deg F	13 %	12.6 cfm	10.0 cfm	
4-1R	72.2 deg F	72.0	0 %	66.9 deg F	0 %	16.5 cfm	0.0 cfm	
4-3R	75.1 deg F	72.0	0 %	72.6 deg F	0 %	0.0 cfm	0.0 cfm	
4-4R	72.8 deg F	72.0	0 %	72.7 deg F	0 %	20.6 cfm	0.0 cfm	
4-7R	74.9 deg F	72.0	0 %	73.9 deg F	0 %	9.5 cfm	0.0 cfm	
4-8R	76.7 deg F	72.0	0 %	73.9 deg F	0 %	111.7 cfm	0.0 cfm	
4-10R	73.7 deg F	72.0	0 %	59.3 deg F	0 %	0.0 cfm	0.0 cfm	
4-12R	75.1 deg F	72.0	0 %	71.4 deg F	0 %	16.1 cfm	0.0 cfm	
4-17R	75.0 deg F	72.0	0 %	75.0 deg F	0 %	0.0 cfm	0.0 cfm	
4-20R	74.1 deg F	72.0	0 %	61.3 deg F	0 %	0.0 cfm	0.0 cfm	
4-21R	76.5 deg F	72.0	0 %	74.2 deg F	0 %	0.0 cfm	0.0 cfm	
4-22R	75.2 deg F	72.0	0 %	71.6 deg F	0 %	0.0 cfm	0.0 cfm	
4-23R	77.1 deg F	72.0	0 %	76.2 deg F	0 %	2.9 cfm	0.0 cfm	
4.000	75 0 45	70.0	0.0/	77.0 45	0.07	20.7 -6	0.05	

Total Row Count: 56



Heat Map





Lessons Learned

- Build a relationship with I.T.
- Ask for references of people that have done integration with your BAS and chosen smart lighting unless you know that you will be first and then be willing to put in the time to work out the bugs
- BACnet is tricky. It might work great for 1 or 2 buildings but then have issues on building 3 or 4.
- Create good back ups of your BAS and your lighting server
- Make sure the installers and integrators know their roles and responsibilities. Lighting person must create the VAV area within lighting program so that BAS programmer has a point to discover and then program to.
- Know what the system should do before the project starts and then document it so everyone else has the same expectations



In Closing

- It may be painful
- It takes time to do it right once
- Once finished it is 100% worth it and you will want to do more.
- I can't imagine ever operating a building again without occupancybased controls
- If better is possible, Good is not enough.





Thank you

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- <u>https://www.csudh.edu/</u> <u>sustainability/campus-</u> <u>initiatives/energy-use/</u>