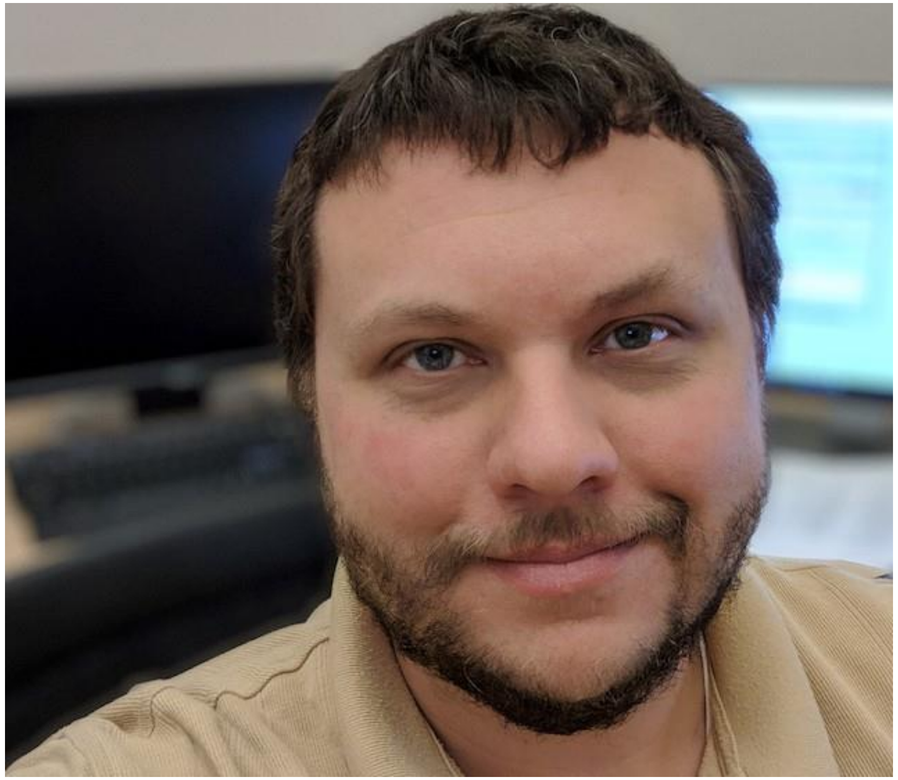
Operation Center Event Summarization

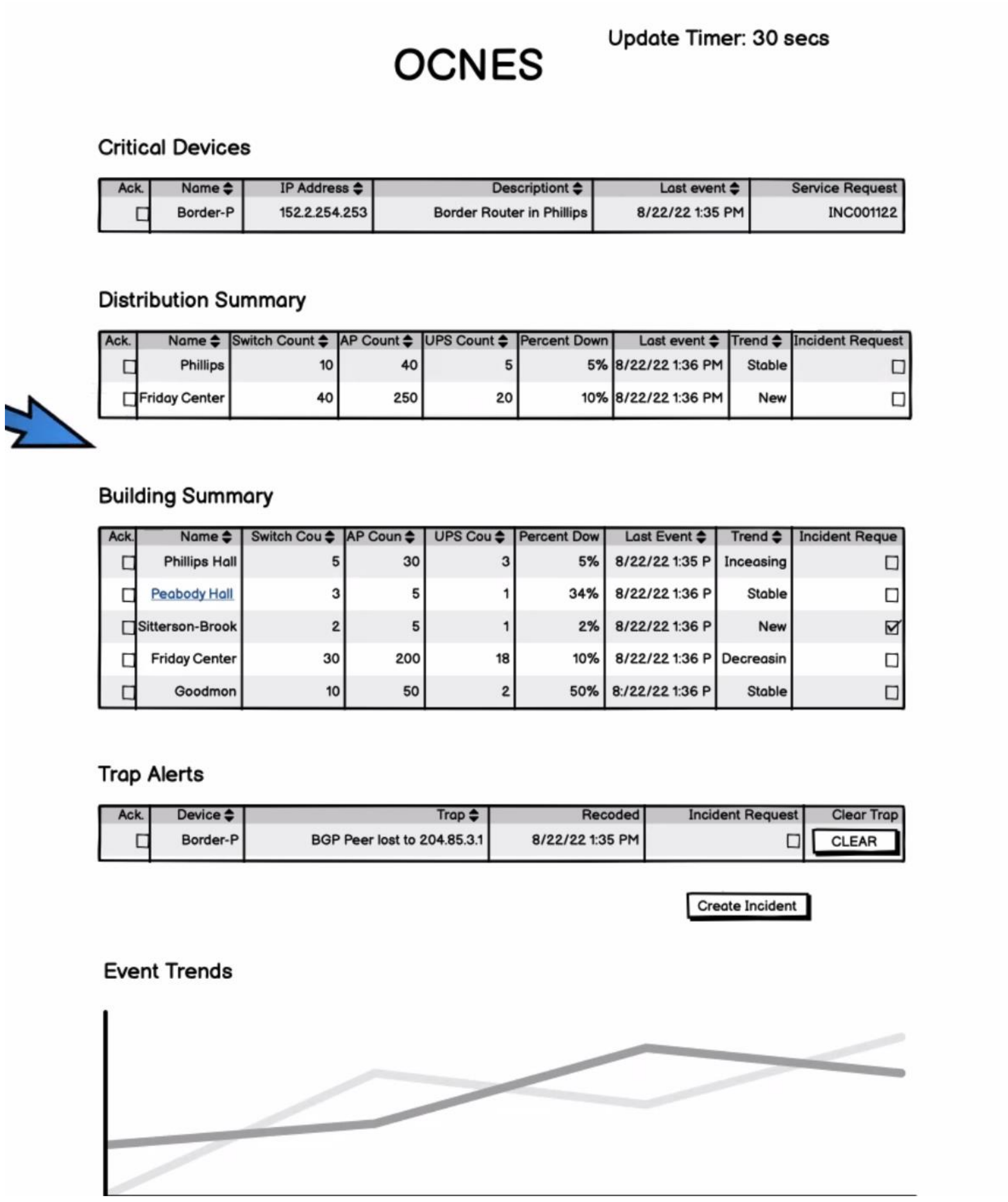
Custom developed Network Monitoring Solution

Special Acknowledgement



William Whitaker
Network Services Architect
UNC Chapel Hill

M.S. Computer Networking
from NC State University



OCNES

Update Timer: 30 secs

Critical Devices

Ack.	Name	IP Address	Descriptiont	Last event	Service Request
□	Border-P	152.2.254.253	Border Router in Phillips	8/22/22 1:35 PM	INC001122

Distribution Summary

Ack.	Name	Switch Count	AP Count	UPS Count	Percent Down	Last event	Trend	Incident Request
□	Phillips	10	40	5	5%	8/22/22 1:36 PM	Stable	□
□	Friday Center	40	250	20	10%	8/22/22 1:36 PM	New	□

Building Summary

Ack.	Name	Switch Cou	AP Coun	UPS Cou	Percent Dow	Last Event	Trend	Incident Reque
□	Phillips Hall	5	30	3	5%	8/22/22 1:35 P	Inceasing	□
□	Peabody Hall	3	5	1	34%	8/22/22 1:36 P	Stable	□
□	Sitterson-Brook	2	5	1	2%	8/22/22 1:36 P	New	☑
□	Friday Center	30	200	18	10%	8/22/22 1:36 P	Decreasin	□
□	Goodmon	10	50	2	50%	8:/22/22 1:36 P	Stable	□

Trap Alerts

Ack.	Device	Trap	Recoded	Incident Request	Clear Trap
□	Border-P	BGP Peer lost to 204.85.3.1	8/22/22 1:35 PM	□	CLEAR

Event Trends

Operations Center Network Event Summary

- Objectives:
  - Simplify large network outages
  - Classify problems and areas of impact
  - Quickly assess scale
  - Trending
  - Get rid of expensive software that does less
  - Lower blood pressure of the Network Director

OCNES

- Key Features
  - Acknowledgment and commenting
  - Creating of incidents with intelligent tracking
  - Adding ‘hibernation’ function that does not exist in AKIPS
  - Provides customizable / tunable audio alerting
  - Associate UPS ‘on battery’ with event

Why AKIPS?

- Most important piece of monitoring software for UNC Networking
- Ridiculously scalable
- Designed for engineers
- No data roll-up for 3 years
- Lightening fast reporting / fault isolation
- Resolves 90% of reported network outages that require intervention
- Extensible
- Affordable

Grouping

Overloading of SysLocation:
Distribution Location – Building Plan – Building Name – Device Type and Number – Room Location

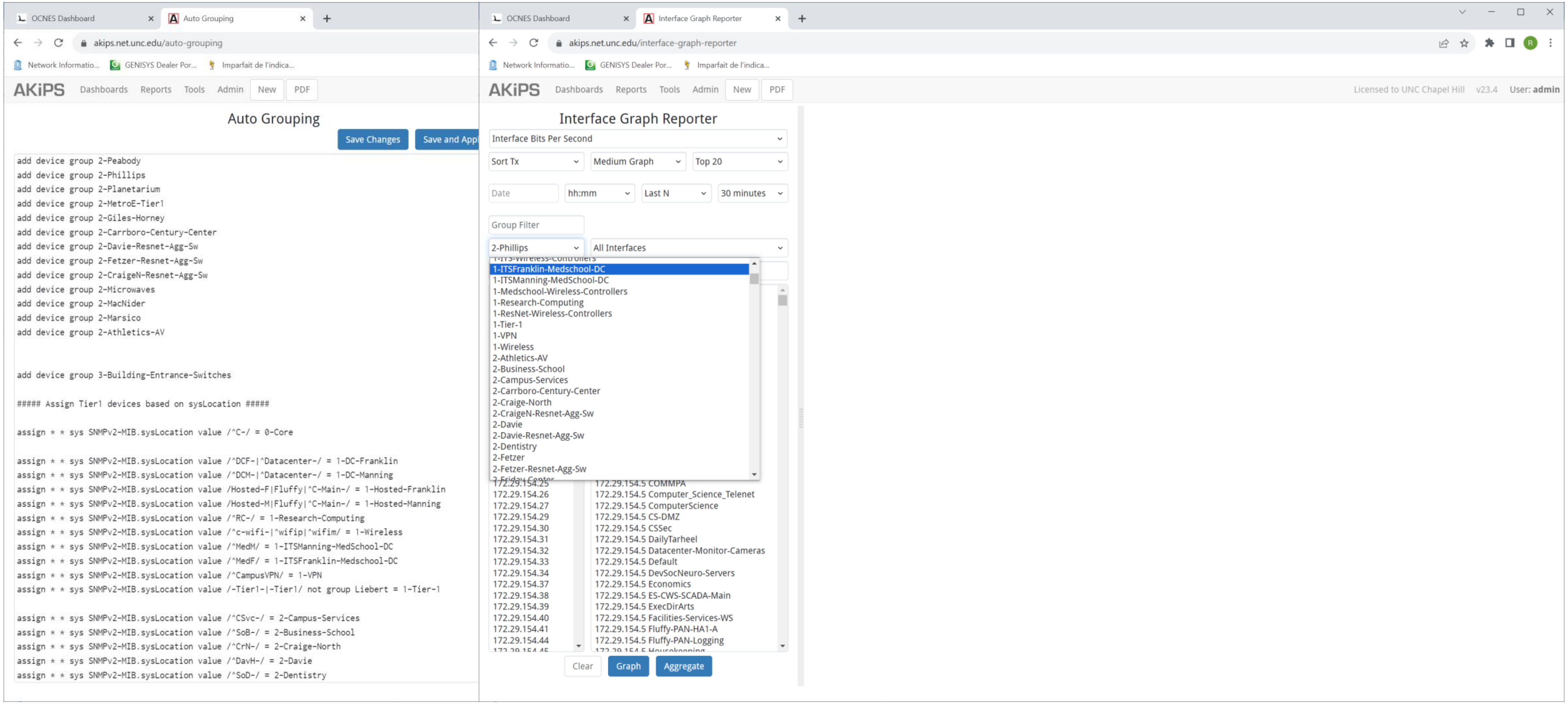
MacN-363-RoperHall-UPS1-Rm8102G

MacNider Distribution Network
Plan Room Number 363
Official Building Name
UPS #1 in the closet
Room 8202 Ground Level

Hierarchy

- We create auto groups that use regex expressions to create a hierarchy of groups
- We use that hierarchy of groups to determine placement in tool
  - Group 0 - Core
  - Group 1 – Critical Devices / ‘The’ Distribution switches
  - Group 2 – Distribution switches with their associated downstream networks
  - Group 3 – ‘The’ Building Entry Switches
  - Group 4 – Building Networks

Auto Grouping Matching



Auto Grouping

```
add device group 2-Peabody
add device group 2-Phillips
add device group 2-Planetarium
add device group 2-MetroE-Tier1
add device group 2-Giles-Horney
add device group 2-Carrboro-Century-Center
add device group 2-Davie-Resnet-Agg-Sw
add device group 2-Fetzer-Resnet-Agg-Sw
add device group 2-CraigeN-Resnet-Agg-Sw
add device group 2-Microwaves
add device group 2-MacNider
add device group 2-Marsico
add device group 2-Athletics-AV


add device group 3-Building-Entrance-Switches

##### Assign Tier1 devices based on sysLocation #####

assign * * sys SNMPv2-MIB.sysLocation value /^C-/ = 0-Core

assign * * sys SNMPv2-MIB.sysLocation value /^DCF-|^Datacenter-/ = 1-DC-Franklin
assign * * sys SNMPv2-MIB.sysLocation value /^DCM-|^Datacenter-/ = 1-DC-Manning
assign * * sys SNMPv2-MIB.sysLocation value /Hosted-F|Fluffy|^C-Main-/ = 1-Hosted-Franklin
assign * * sys SNMPv2-MIB.sysLocation value /Hosted-M|Fluffy|^C-Main-/ = 1-Hosted-Manning
assign * * sys SNMPv2-MIB.sysLocation value /^RC-/ = 1-Research-Computing
assign * * sys SNMPv2-MIB.sysLocation value /^c-wifi-|^wifip|^wifim/ = 1-Wireless
assign * * sys SNMPv2-MIB.sysLocation value /^MedM/ = 1-ITSManning-MedSchool-DC
assign * * sys SNMPv2-MIB.sysLocation value /^MedF/ = 1-ITSFranklin-Medschool-DC
assign * * sys SNMPv2-MIB.sysLocation value /^CampusVPN/ = 1-VPN
assign * * sys SNMPv2-MIB.sysLocation value /-Tier1-|-Tier1/ not group Liebert = 1-Tier-1

assign * * sys SNMPv2-MIB.sysLocation value /^CSvc-/ = 2-Campus-Services
assign * * sys SNMPv2-MIB.sysLocation value /^SoB-/ = 2-Business-School
assign * * sys SNMPv2-MIB.sysLocation value /^CrN-/ = 2-Craige-North
assign * * sys SNMPv2-MIB.sysLocation value /^DavH-/ = 2-Davie
assign * * sys SNMPv2-MIB.sysLocation value /^SoD-/ = 2-Dentistry
```

Interface Graph Reporter

Interface Bits Per Second

Sort Tx | Medium Graph | Top 20

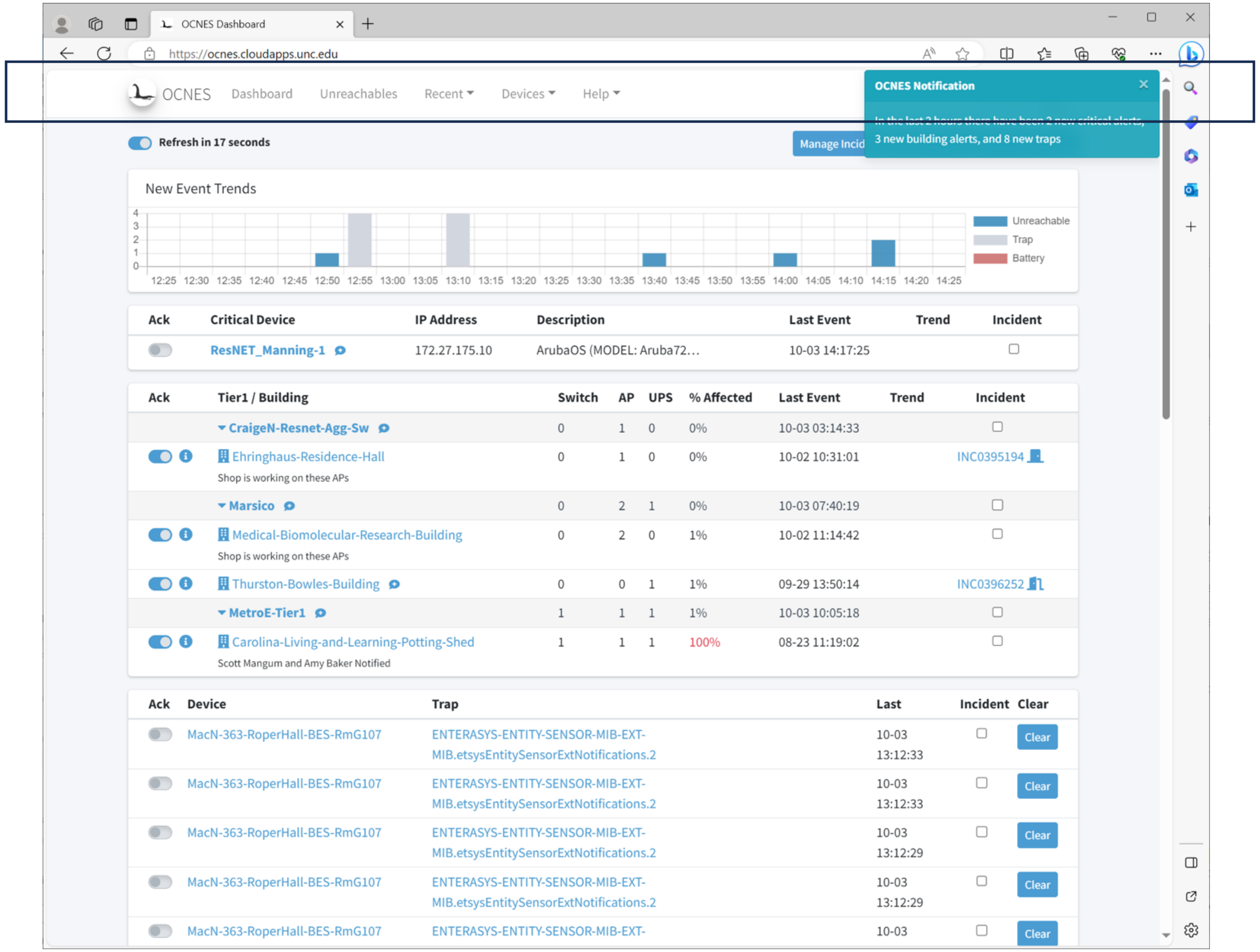
Date | hh:mm | Last N | 30 minutes

Group Filter

2-Phillips | All Interfaces

```
1-ITS-Wireless-Controllers
1-ITSFranklin-Medschool-DC
1-ITSManning-MedSchool-DC
1-Medschool-Wireless-Controllers
1-Research-Computing
1-ResNet-Wireless-Controllers
1-Tier-1
1-VPN
1-Wireless
2-Athletics-AV
2-Business-School
2-Campus-Services
2-Carrboro-Century-Center
2-Craige-North
2-CraigeN-Resnet-Agg-Sw
2-Davie
2-Davie-Resnet-Agg-Sw
2-Dentistry
2-Fetzer
2-Fetzer-Resnet-Agg-Sw
2-Friday-Center
```

```
172.29.154.25       172.29.154.5 COMMPA
172.29.154.26       172.29.154.5 Computer_Science_Telenet
172.29.154.27       172.29.154.5 ComputerScience
172.29.154.29       172.29.154.5 CS-DMZ
172.29.154.30       172.29.154.5 CSSec
172.29.154.31       172.29.154.5 DailyTarheel
172.29.154.32       172.29.154.5 Datacenter-Monitor-Cameras
172.29.154.33       172.29.154.5 Default
172.29.154.34       172.29.154.5 DevSocNeuro-Servers
172.29.154.37       172.29.154.5 Economics
172.29.154.38       172.29.154.5 ES-CWS-SCADA-Main
172.29.154.39       172.29.154.5 ExecDirArts
172.29.154.40       172.29.154.5 Facilities-Services-WS
172.29.154.41       172.29.154.5 Fluffy-PAN-HA1-A
172.29.154.44       172.29.154.5 Fluffy-PAN-Logging
172.29.154.45       172.29.154.5 Housekeeping
```



OCNES Notification

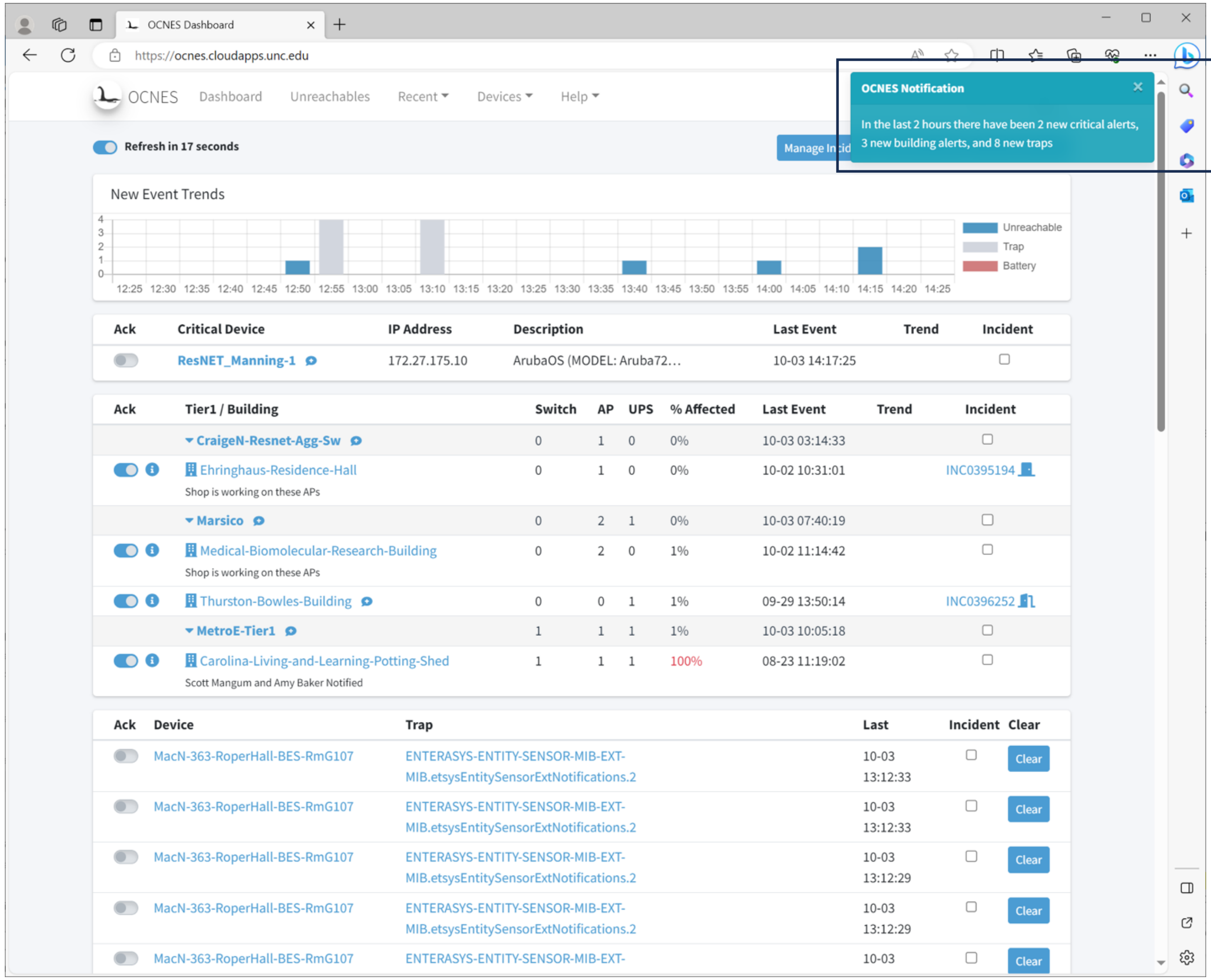
In the last 2 hours there have been 2 new critical alerts, 3 new building alerts, and 8 new traps

Ack	Critical Device	IP Address	Description	Last Event	Trend	Incident
	ResNET_Manning-1	172.27.175.10	ArubaOS (MODEL: Aruba72...	10-03 14:17:25		□

Ack	Tier1 / Building	Switch	AP	UPS	% Affected	Last Event	Trend	Incident
	CraigeN-Resnet-Agg-Sw	0	1	0	0%	10-03 03:14:33		□
	Ehringhaus-Residence-Hall Shop is working on these APs	0	1	0	0%	10-02 10:31:01		INC0395194
	Marsico	0	2	1	0%	10-03 07:40:19		□
	Medical-Biomolecular-Research-Building Shop is working on these APs	0	2	0	1%	10-02 11:14:42		□
	Thurston-Bowles-Building	0	0	1	1%	09-29 13:50:14		INC0396252
	MetroE-Tier1	1	1	1	1%	10-03 10:05:18		□
	Carolina-Living-and-Learning-Potting-Shed Scott Mangum and Amy Baker Notified	1	1	1	100%	08-23 11:19:02		□

Ack	Device	Trap	Last	Incident	Clear
	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-MIB.etsysEntitySensorExtNotifications.2	10-03 13:12:33	□	Clear
	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-MIB.etsysEntitySensorExtNotifications.2	10-03 13:12:33	□	Clear
	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-MIB.etsysEntitySensorExtNotifications.2	10-03 13:12:29	□	Clear
	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-MIB.etsysEntitySensorExtNotifications.2	10-03 13:12:29	□	Clear
	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-	10-03	□	Clear

Navigation bar



Refresh in 17 seconds

OCNES Notification

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	Carolina-Living-and-Learning-Potting-Shed Scott Mangum and Amy Baker Notified	1	1	1	100%	08-23 11:19:02		□

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	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-MIB.etsysEntitySensorExtNotifications.2	10-03 13:12:29	□	Clear
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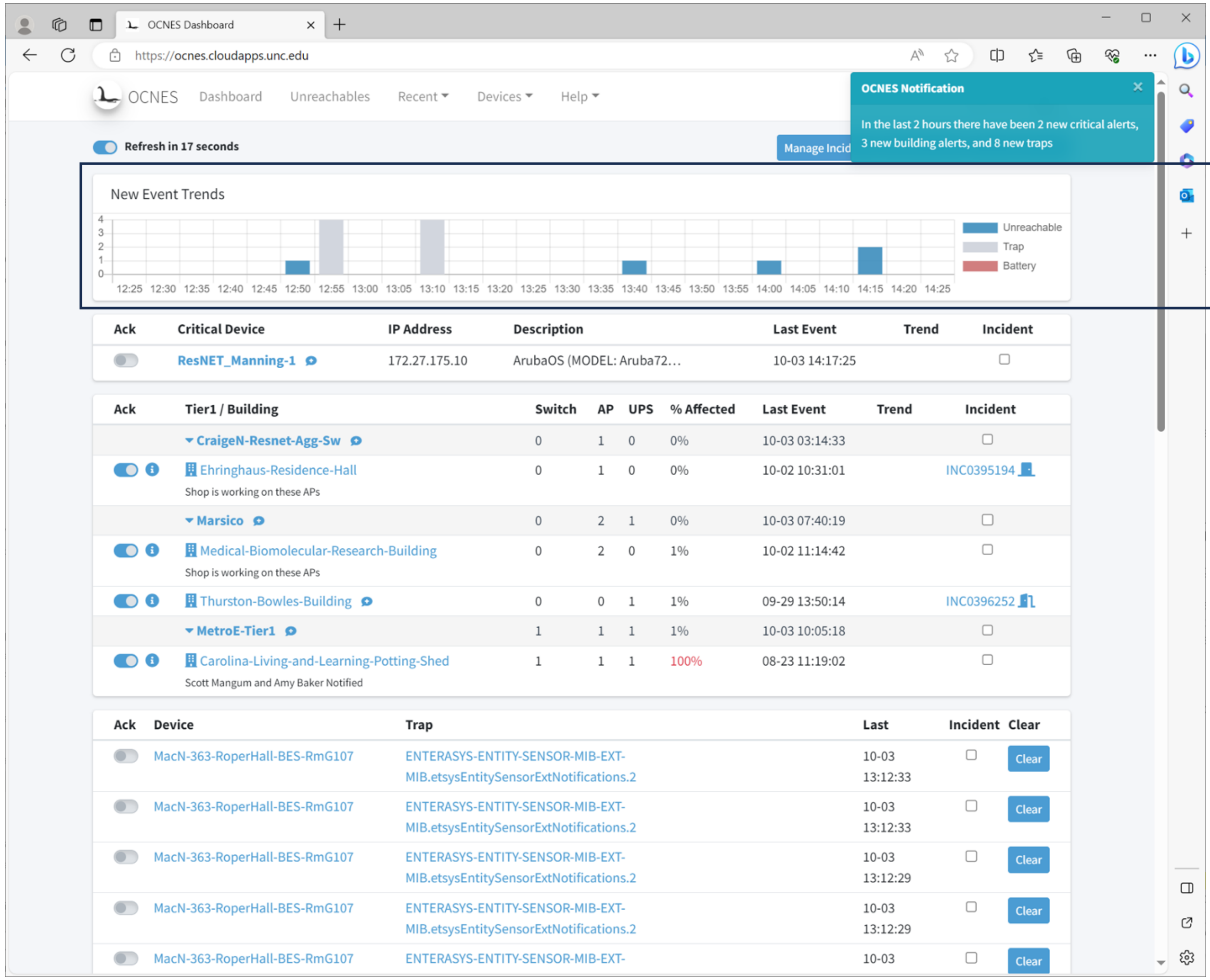
	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-	10-03	□	Clear

New Session Notification



OCNES Notification

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Refresh in 17 seconds

New Event Trends

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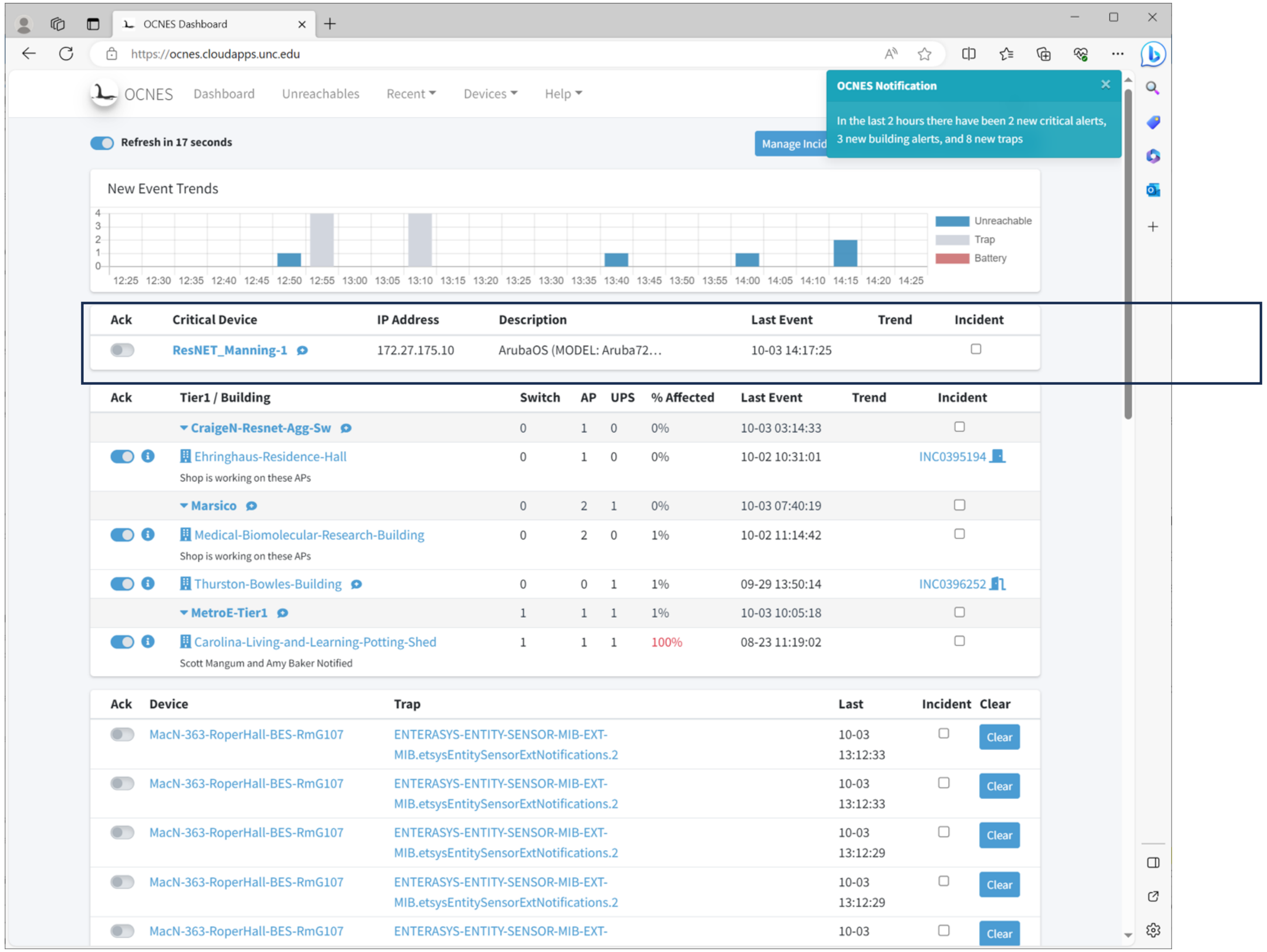
	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-MIB.etsysEntitySensorExtNotifications.2	10-03 13:12:29	□	Clear
	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-MIB.etsysEntitySensorExtNotifications.2	10-03 13:12:29	□	Clear
	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-	10-03	□	Clear

2 hour event graph



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● Refresh in 17 seconds

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● ⓘ	Thurston-Bowles-Building	0	0	1	1%	09-29 13:50:14		INC0396252
	MetroE-Tier1	1	1	1	1%	10-03 10:05:18		□
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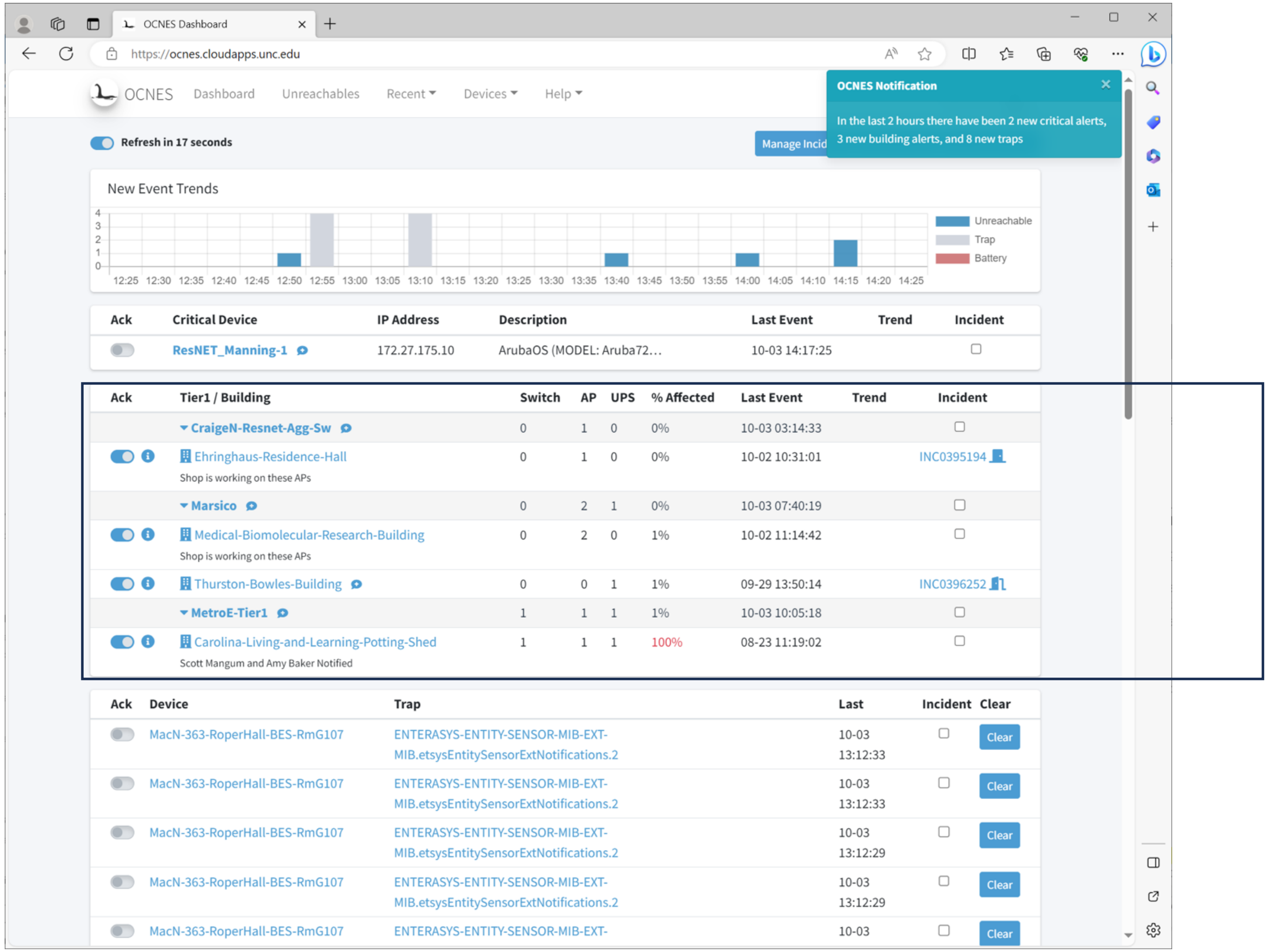
○	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-MIB.etsysEntitySensorExtNotifications.2	10-03 13:12:33	□	Clear
○	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-MIB.etsysEntitySensorExtNotifications.2	10-03 13:12:29	□	Clear
○	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-MIB.etsysEntitySensorExtNotifications.2	10-03 13:12:29	□	Clear
○	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-	10-03	□	Clear

Critical Device Zone



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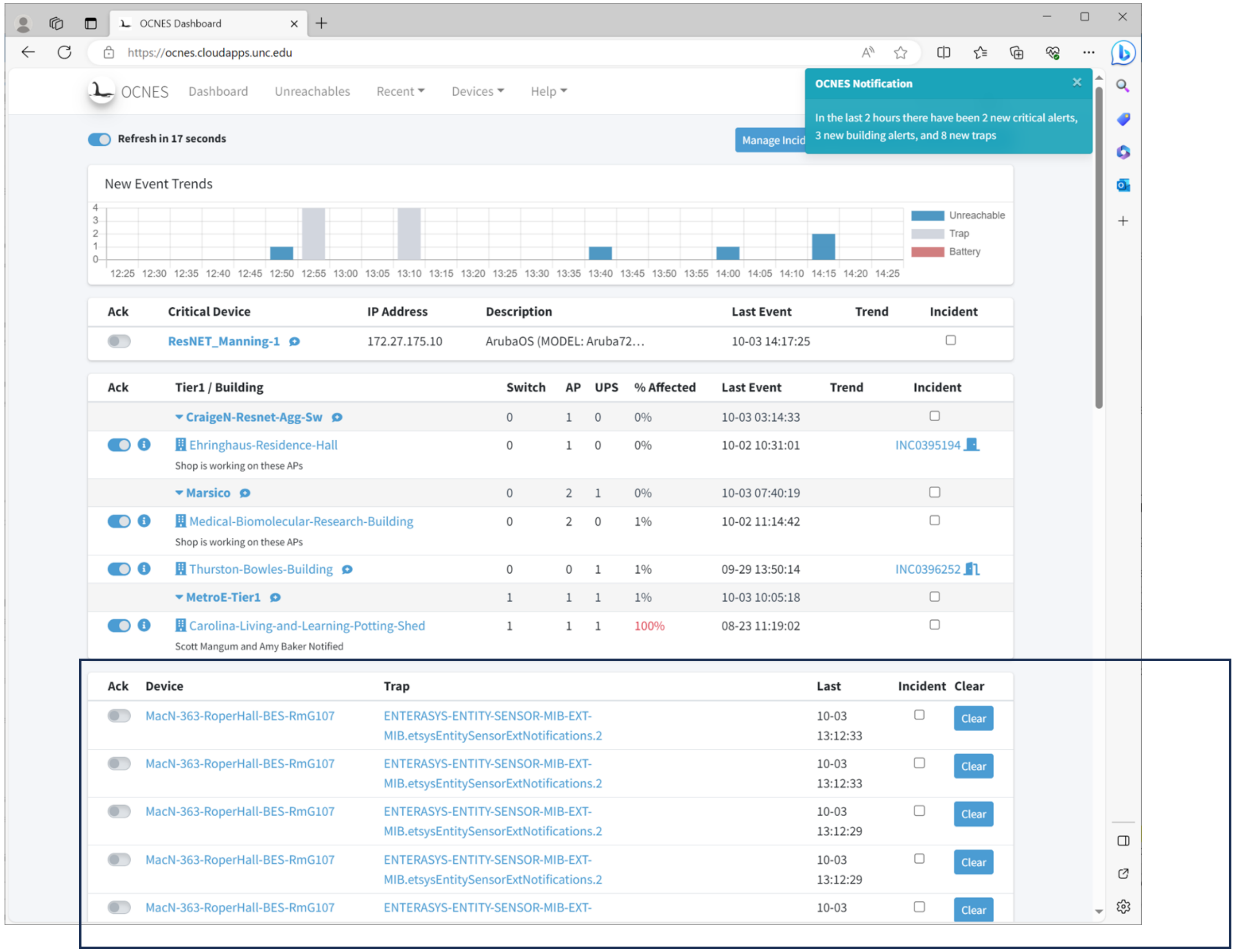
○	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-	10-03	□	Clear

Distribution Network Summarization Zone



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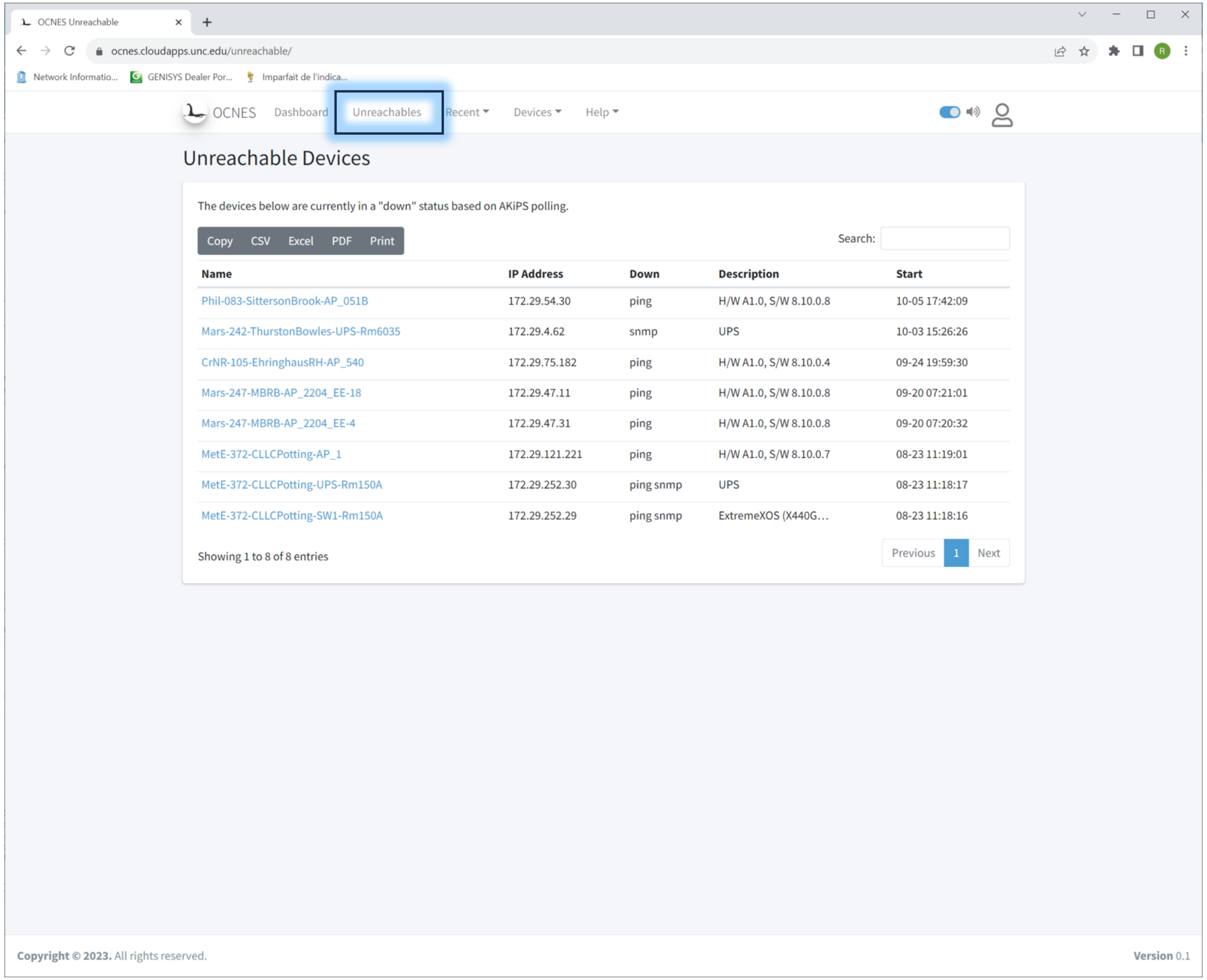
○	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-MIB.etsysEntitySensorExtNotifications.2	10-03 13:12:29	□	Clear
○	MacN-363-RoperHall-BES-RmG107	ENTERASYS-ENTITY-SENSOR-MIB-EXT-	10-03	□	Clear

Trap Zone



Unreachable Devices

The devices below are currently in a "down" status based on AKiPS polling.

Name	IP Address	Down	Description	Start
Phil-083-SittersonBrook-AP_051B	172.29.54.30	ping	H/W A1.0, S/W 8.10.0.8	10-05 17:42:09
Mars-242-ThurstonBowles-UPS-Rm6035	172.29.4.62	snmp	UPS	10-03 15:26:26
CrNR-105-EhringhausRH-AP_540	172.29.75.182	ping	H/W A1.0, S/W 8.10.0.4	09-24 19:59:30
Mars-247-MBRB-AP_2204_EE-18	172.29.47.11	ping	H/W A1.0, S/W 8.10.0.8	09-20 07:21:01
Mars-247-MBRB-AP_2204_EE-4	172.29.47.31	ping	H/W A1.0, S/W 8.10.0.8	09-20 07:20:32
MetE-372-CLLCPotting-AP_1	172.29.121.221	ping	H/W A1.0, S/W 8.10.0.7	08-23 11:19:01
MetE-372-CLLCPotting-UPS-Rm150A	172.29.252.30	ping snmp	UPS	08-23 11:18:17
MetE-372-CLLCPotting-SW1-Rm150A	172.29.252.29	ping snmp	ExtremeXOS (X440G…	08-23 11:18:16

Showing 1 to 8 of 8 entries

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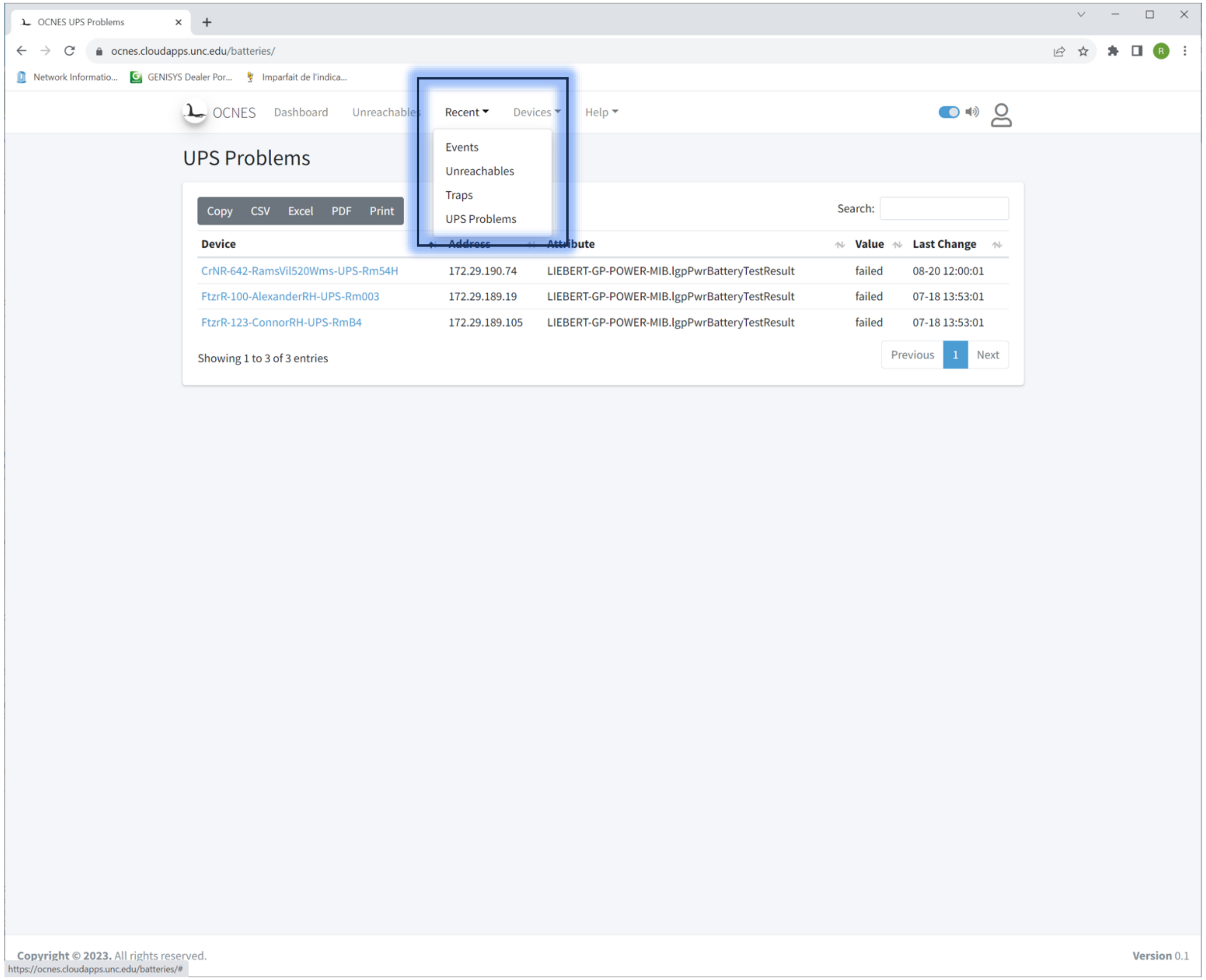
Version 0.1

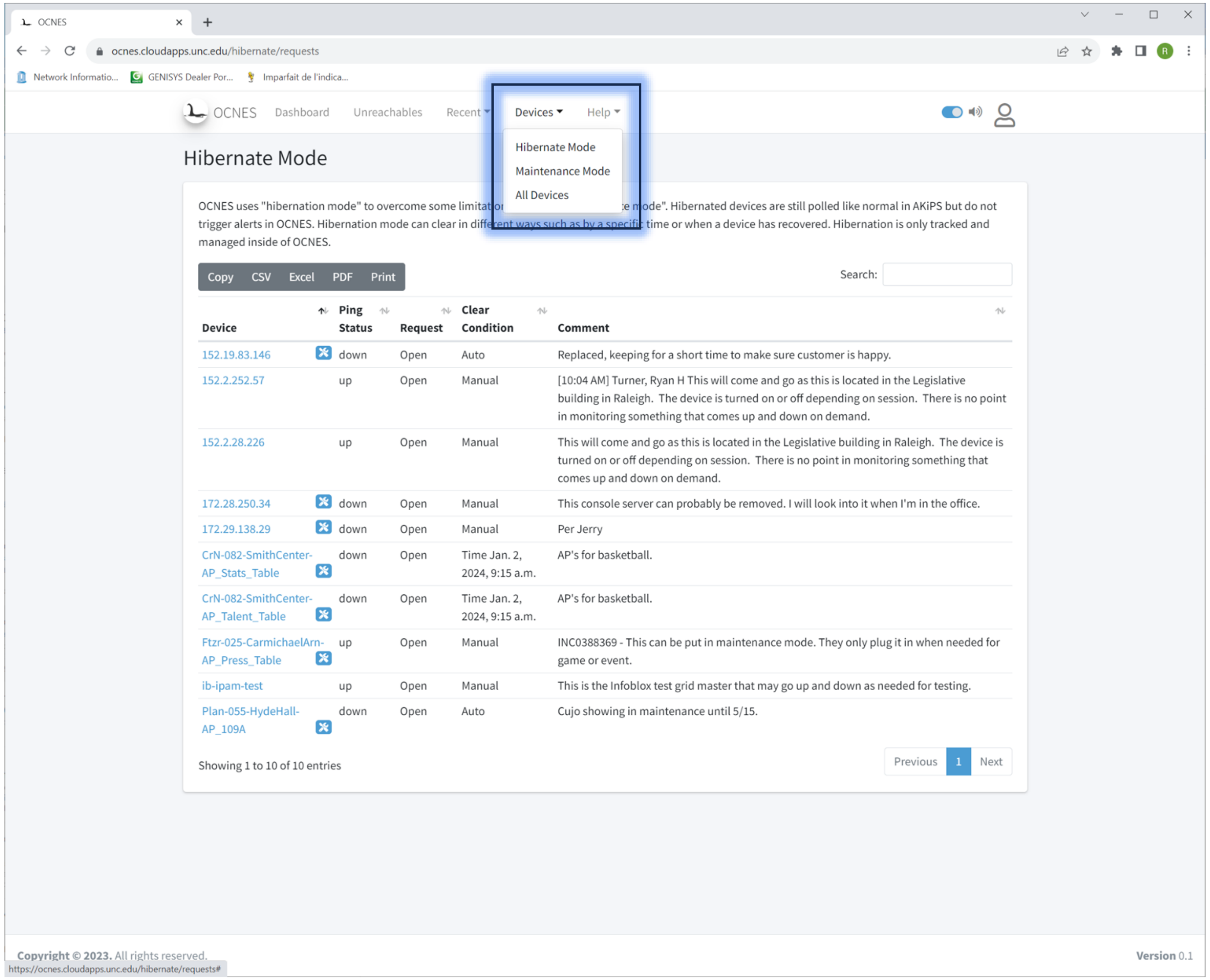


UPS Problems

Device	Address	Attribute	Value	Last Change
CrNR-642-RamsVil520Wms-UPS-Rm54H	172.29.190.74	LIEBERT-GP-POWER-MIB.lgpPwrBatteryTestResult	failed	08-20 12:00:01
FtzrR-100-AlexanderRH-UPS-Rm003	172.29.189.19	LIEBERT-GP-POWER-MIB.lgpPwrBatteryTestResult	failed	07-18 13:53:01
FtzrR-123-ConnorRH-UPS-RmB4	172.29.189.105	LIEBERT-GP-POWER-MIB.lgpPwrBatteryTestResult	failed	07-18 13:53:01

Showing 1 to 3 of 3 entries

Version 0.1



Hibernate Mode

OCNES uses "hibernation mode" to overcome some limitatio e mode". Hibernated devices are still polled like normal in AKiPS but do not trigger alerts in OCNES. Hibernation mode can clear in different ways such as by a specific time or when a device has recovered. Hibernation is only tracked and managed inside of OCNES.

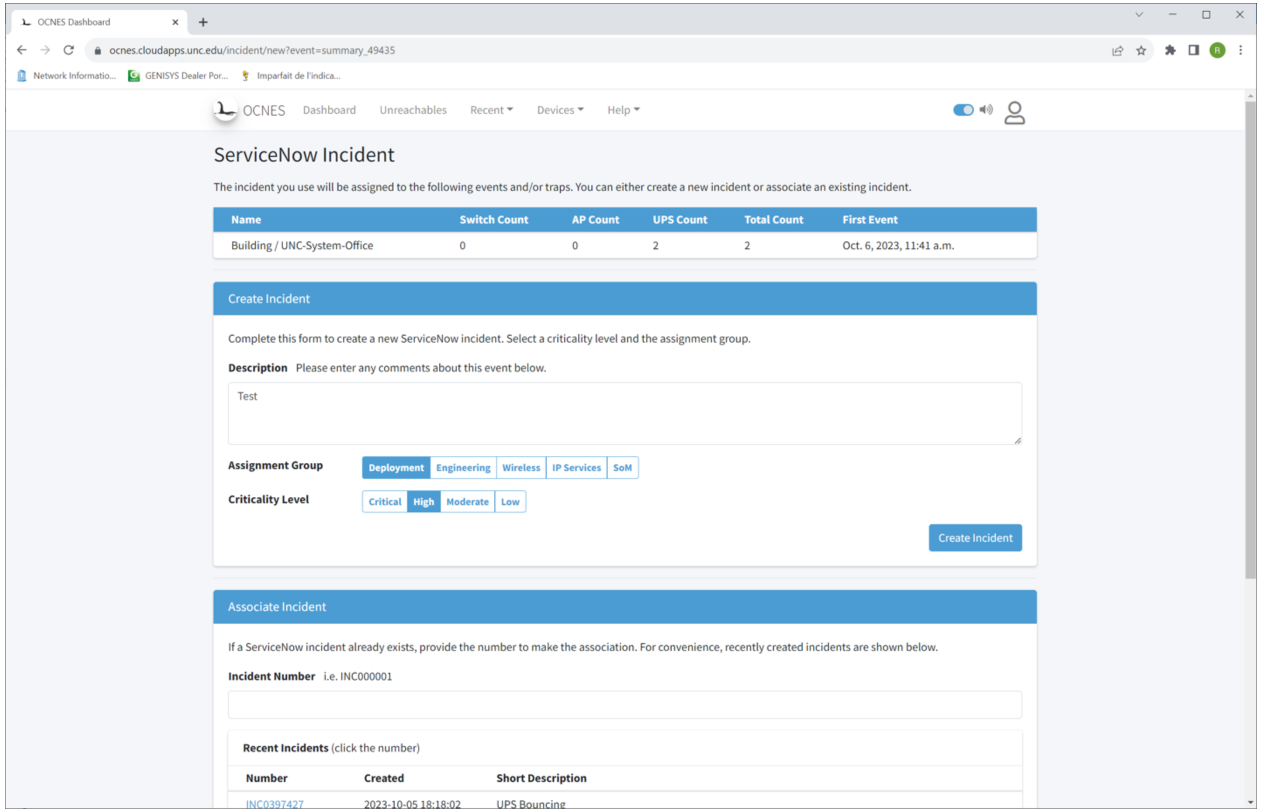
Device	Ping Status	Request	Clear Condition	Comment
152.19.83.146	down	Open	Auto	Replaced, keeping for a short time to make sure customer is happy.
152.2.252.57	up	Open	Manual	[10:04 AM] Turner, Ryan H This will come and go as this is located in the Legislative building in Raleigh. The device is turned on or off depending on session. There is no point in monitoring something that comes up and down on demand.
152.2.28.226	up	Open	Manual	This will come and go as this is located in the Legislative building in Raleigh. The device is turned on or off depending on session. There is no point in monitoring something that comes up and down on demand.
172.28.250.34	down	Open	Manual	This console server can probably be removed. I will look into it when I'm in the office.
172.29.138.29	down	Open	Manual	Per Jerry
CrN-082-SmithCenter-AP_Stats_Table	down	Open	Time Jan. 2, 2024, 9:15 a.m.	AP's for basketball.
CrN-082-SmithCenter-AP_Talent_Table	down	Open	Time Jan. 2, 2024, 9:15 a.m.	AP's for basketball.
Ftzr-025-CarmichaelArn-AP_Press_Table	up	Open	Manual	INC0388369 - This can be put in maintenance mode. They only plug it in when needed for game or event.
ib-ipam-test	up	Open	Manual	This is the Infoblox test grid master that may go up and down as needed for testing.
Plan-055-HydeHall-AP_109A	down	Open	Auto	Cujo showing in maintenance until 5/15.

Showing 1 to 10 of 10 entries

Version 0.1

https://ocnes.cloudapps.unc.edu/hibernate/requests#

Incident Creation | Auto Tracking



ServiceNow Incident

The incident you use will be assigned to the following events and/or traps. You can either create a new incident or associate an existing incident.

Name	Switch Count	AP Count	UPS Count	Total Count	First Event
Building / UNC-System-Office	0	0	2	2	Oct. 6, 2023, 11:41 a.m.

Create Incident

Complete this form to create a new ServiceNow incident. Select a criticality level and the assignment group.

Description Please enter any comments about this event below.

Test

Assignment Group [✓ Deployment] Engineering Wireless IP Services SoM

Criticality Level Critical [✓ High] Moderate Low

Create Incident

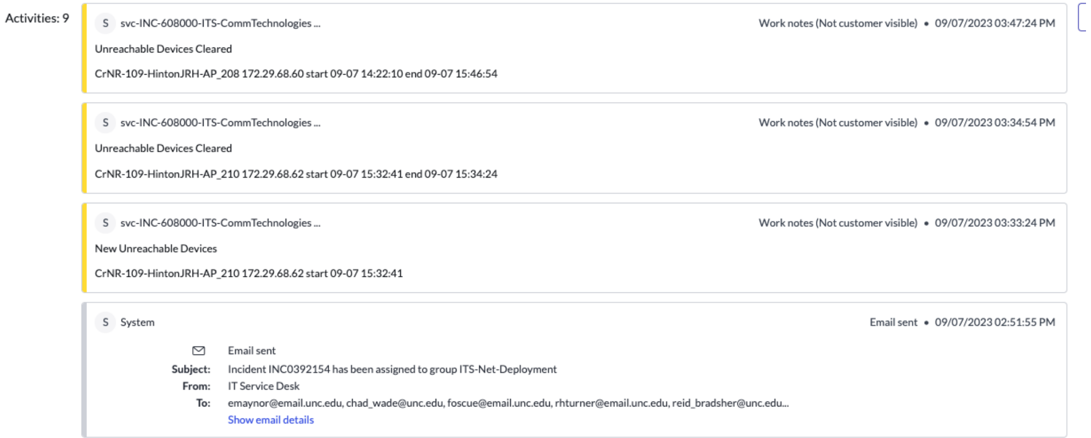
Associate Incident

If a ServiceNow incident already exists, provide the number to make the association. For convenience, recently created incidents are shown below.

Incident Number i.e. INC000001

Recent Incidents (click the number)

Number	Created	Short Description
INC0397427	2023-10-05 18:18:02	UPS Bouncing



Activities: 9

S svc-INC-608000-ITS-CommTechnologies ... Work notes (Not customer visible) • 09/07/2023 03:47:24 PM

Unreachable Devices Cleared

CrNR-109-HintonJRH-AP_208 172.29.68.60 start 09-07 14:22:10 end 09-07 15:46:54

S svc-INC-608000-ITS-CommTechnologies ... Work notes (Not customer visible) • 09/07/2023 03:34:54 PM

Unreachable Devices Cleared

CrNR-109-HintonJRH-AP_210 172.29.68.62 start 09-07 15:32:41 end 09-07 15:34:24

S svc-INC-608000-ITS-CommTechnologies ... Work notes (Not customer visible) • 09/07/2023 03:33:24 PM

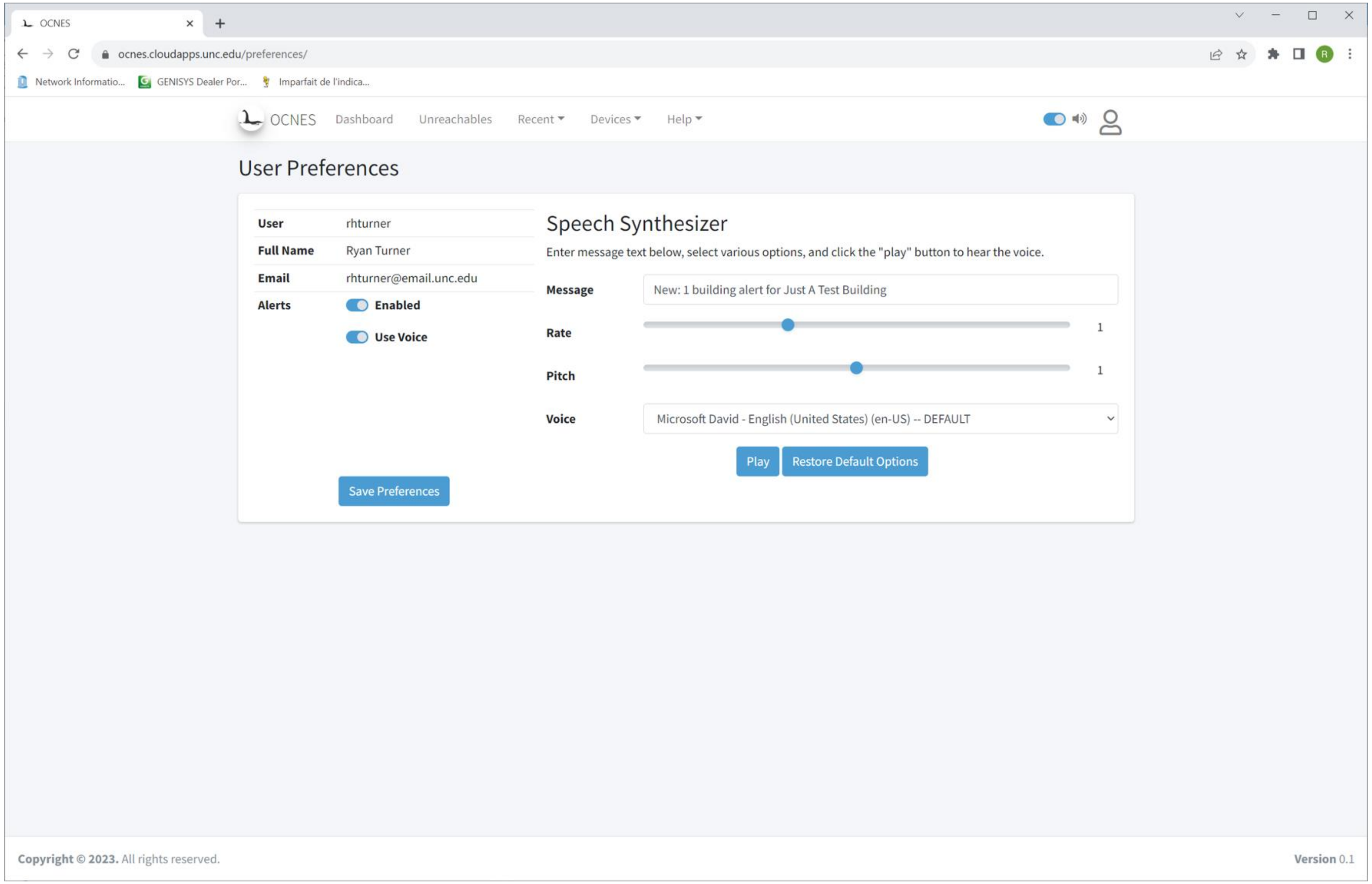
New Unreachable Devices

CrNR-109-HintonJRH-AP_210 172.29.68.62 start 09-07 15:32:41

S System Email sent • 09/07/2023 02:51:55 PM

Email sent
Subject: Incident INC0392154 has been assigned to group ITS-Net-Deployment
From: IT Service Desk
To: emaynor@email.unc.edu, chad_wade@unc.edu, foscue@email.unc.edu, rhturner@email.unc.edu, reid_bradsher@unc.edu...
Show email details

User Preferences



User Preferences

User	rhturner
Full Name	Ryan Turner
Email	rhturner@email.unc.edu
Alerts	Enabled
	Use Voice

Speech Synthesizer

Enter message text below, select various options, and click the "play" button to hear the voice.

Message: New: 1 building alert for Just A Test Building

Rate: 1

Pitch: 1

Voice: Microsoft David - English (United States) (en-US) -- DEFAULT

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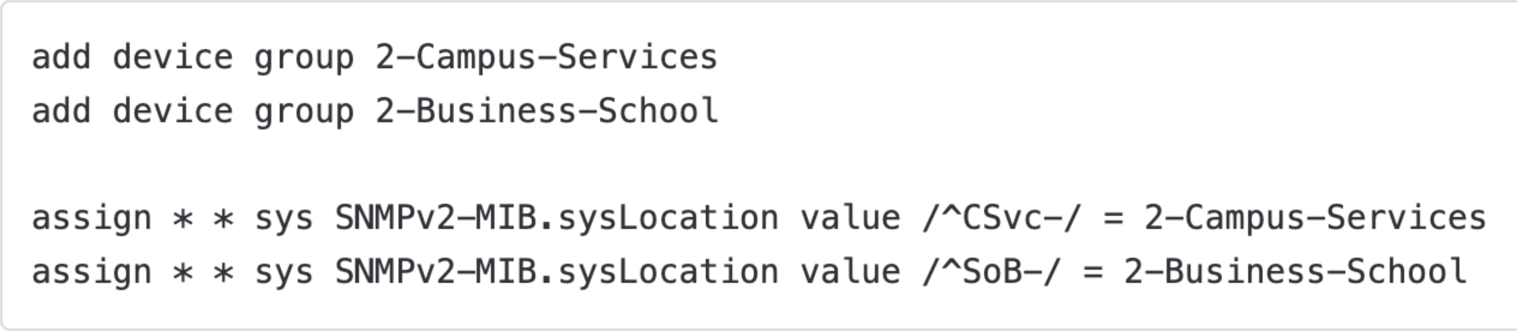
Version 0.1

AKiPS Device Grouping

- Device Grouping
  - Establish hierarchy
  - Organize criticality

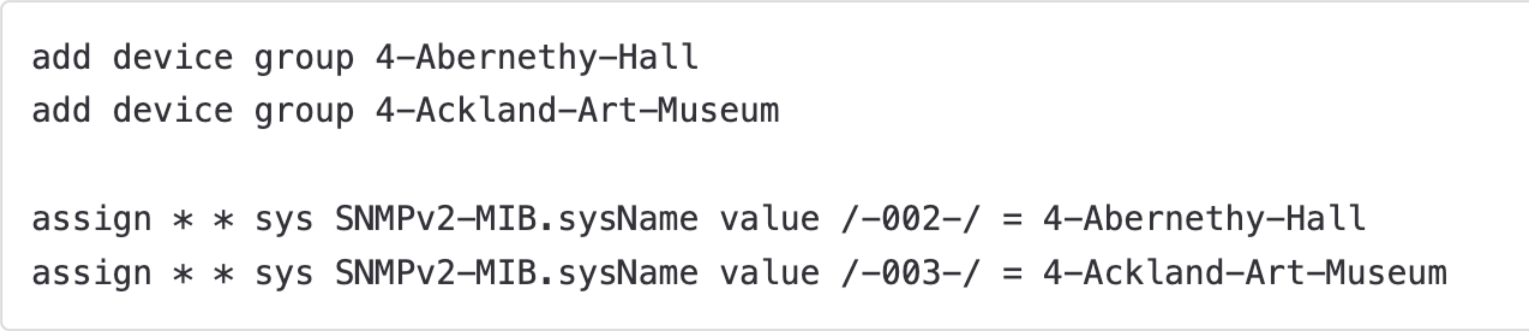
- Naming Convention
  - Device type

- Auxiliary Inventory Feed
  - Supplemental info



```
add device group 2-Campus-Services
add device group 2-Business-School

assign * * sys SNMPv2-MIB.sysLocation value /^CSvc-/ = 2-Campus-Services
assign * * sys SNMPv2-MIB.sysLocation value /^SoB-/ = 2-Business-School
```

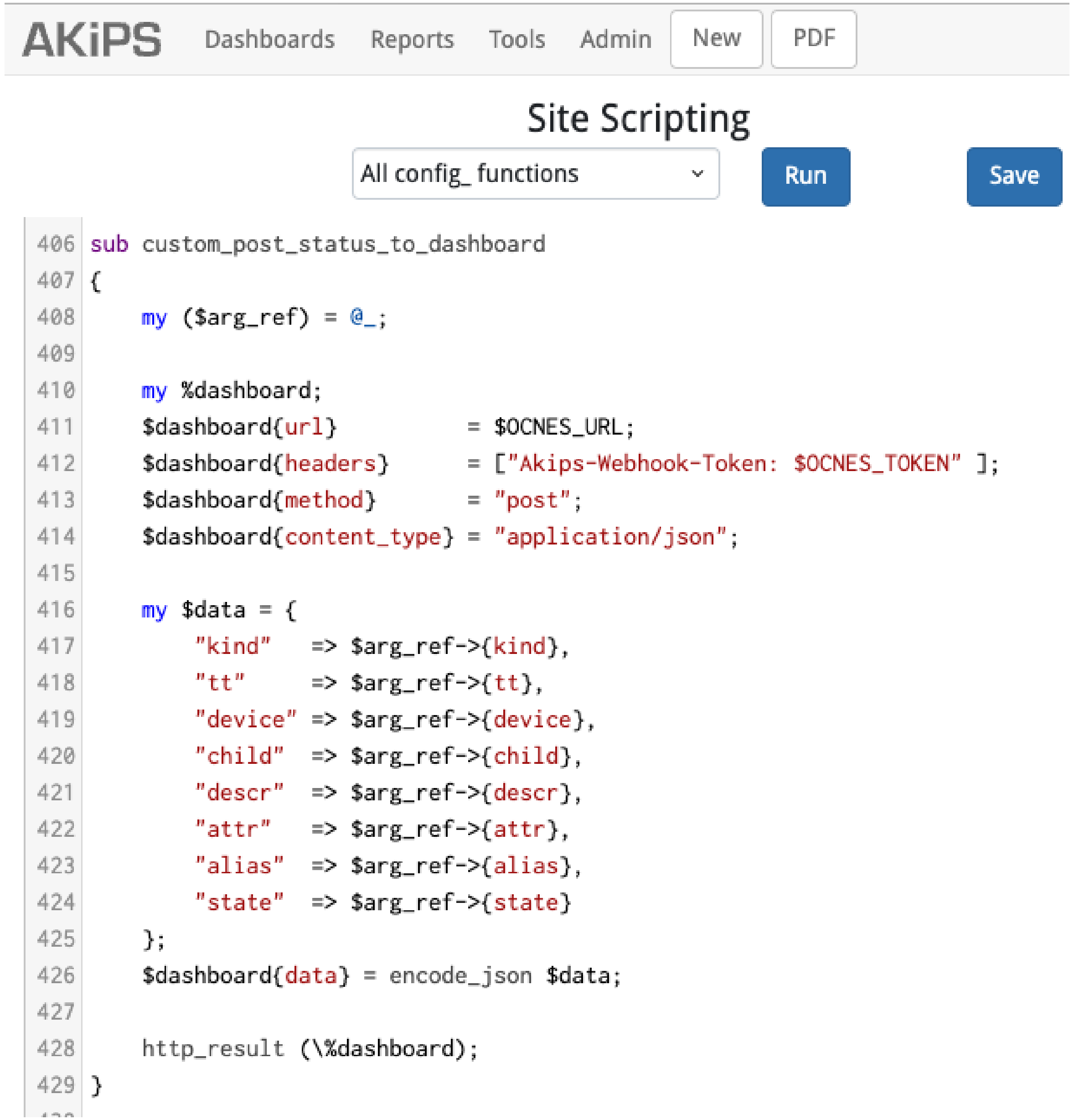


```
add device group 4-Abernethy-Hall
add device group 4-Ackland-Art-Museum

assign * * sys SNMPv2-MIB.sysName value /-002-/ = 4-Abernethy-Hall
assign * * sys SNMPv2-MIB.sysName value /-003-/ = 4-Ackland-Art-Museum
```

AKiPS Scripting

- Web API
  - Pull data from AKiPS
- Status and Trap Alerting
  - Timely data pushes
  - Target key data
- Site Scripts
  - Applicable to both

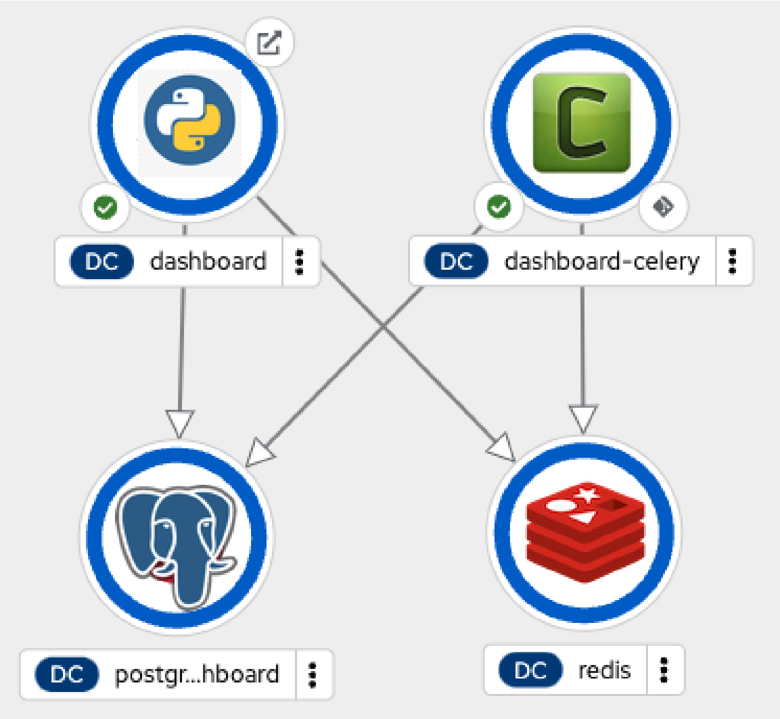


```
sub custom_post_status_to_dashboard
{
    my ($arg_ref) = @_;

    my %dashboard;
    $dashboard{url}              = $OCNES_URL;
    $dashboard{headers}          = ["Akips-Webhook-Token: $OCNES_TOKEN" ];
    $dashboard{method}           = "post";
    $dashboard{content_type} = "application/json";

    my $data = {
        "kind"   => $arg_ref->{kind},
        "tt"     => $arg_ref->{tt},
        "device" => $arg_ref->{device},
        "child"  => $arg_ref->{child},
        "descr"  => $arg_ref->{descr},
        "attr"   => $arg_ref->{attr},
        "alias"  => $arg_ref->{alias},
        "state"  => $arg_ref->{state}
    };
    $dashboard{data} = encode_json $data;

    http_result (\%dashboard);
}
```



OCNES Components

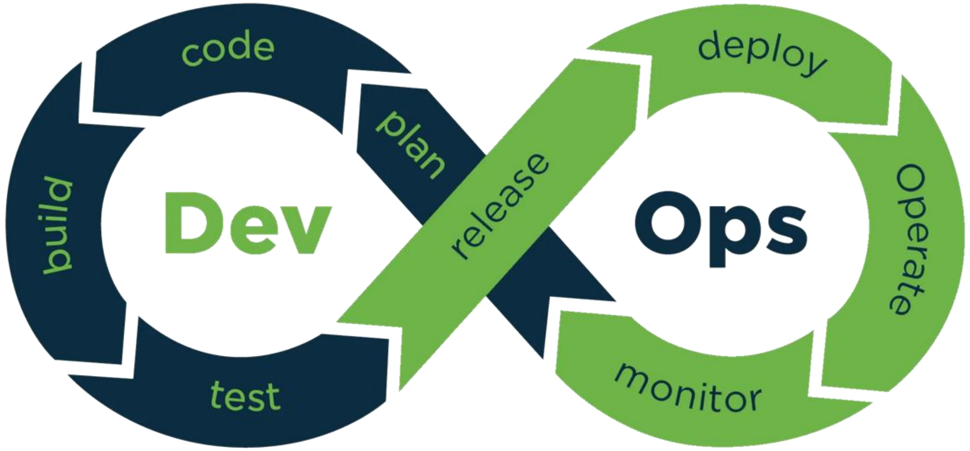
- Microservices Architecture
- Four Components
- Open-Source Products

- Python Centric

- Developed first on OpenShift
- Docker option for dev work
- K3s in the works (lightweight Kubernetes)

Development Environment

- Cross-departmental Team
  - Varied Skillsets
- GitLab Code Repository
  - CI/CD Pipeline
- Agile Development
  - Jira Scrum Board
  - Product Backlog
  - 2 Week Sprint Cycles
  - Weekly Meetings



Moving Forward

- OCNES Availability

- Cross-team to Cross-institutional Development

- Application refinements and improvements applicable to different deployments of AKiPS