

Air Force Technical Applications Center

A Different Approach to Data Availability

It's More Than Just a Performance Metric!



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Overview



- **Approach**
- **Data Review and Examples**
- **Projecting Network Performance**
- **Decision Modeling**
- **Summary**



Approach



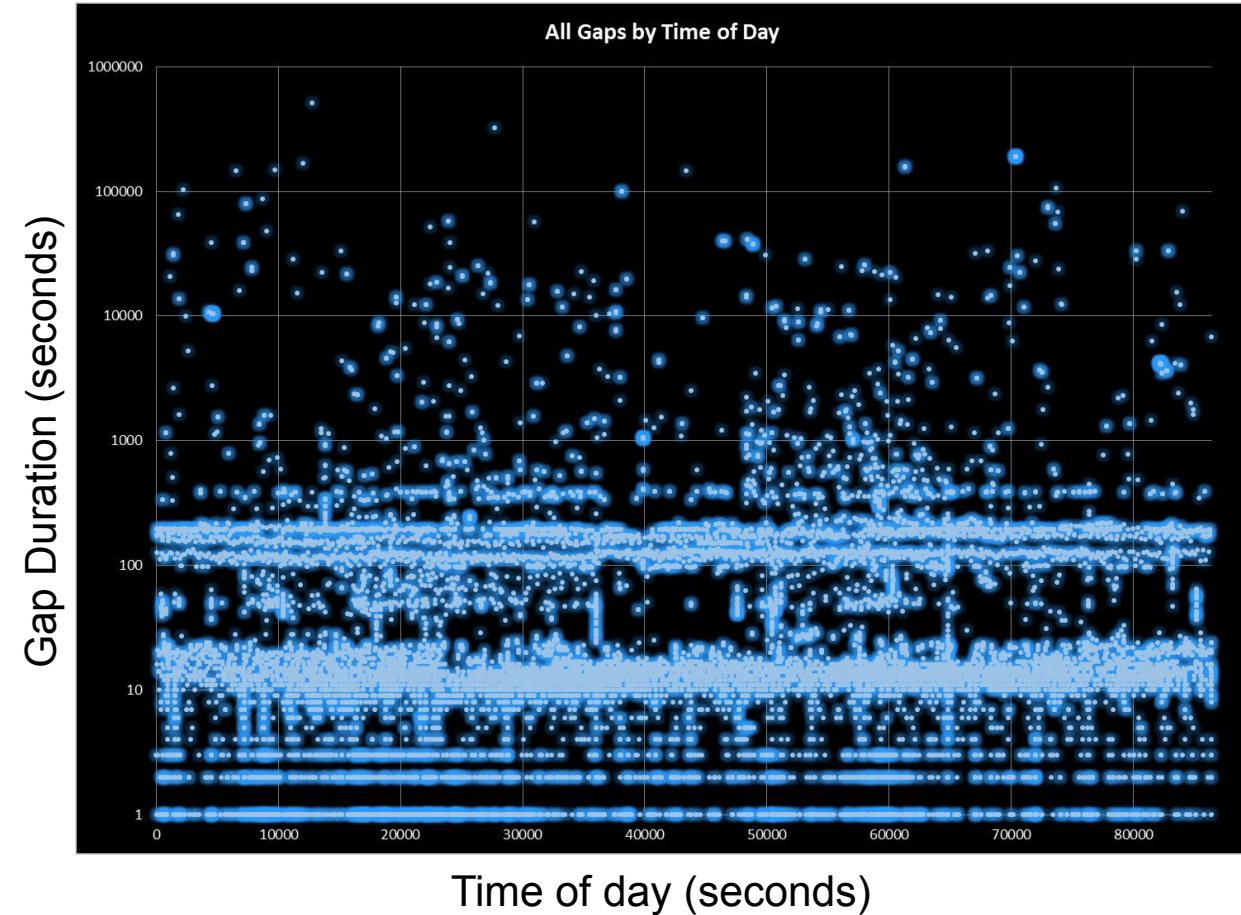
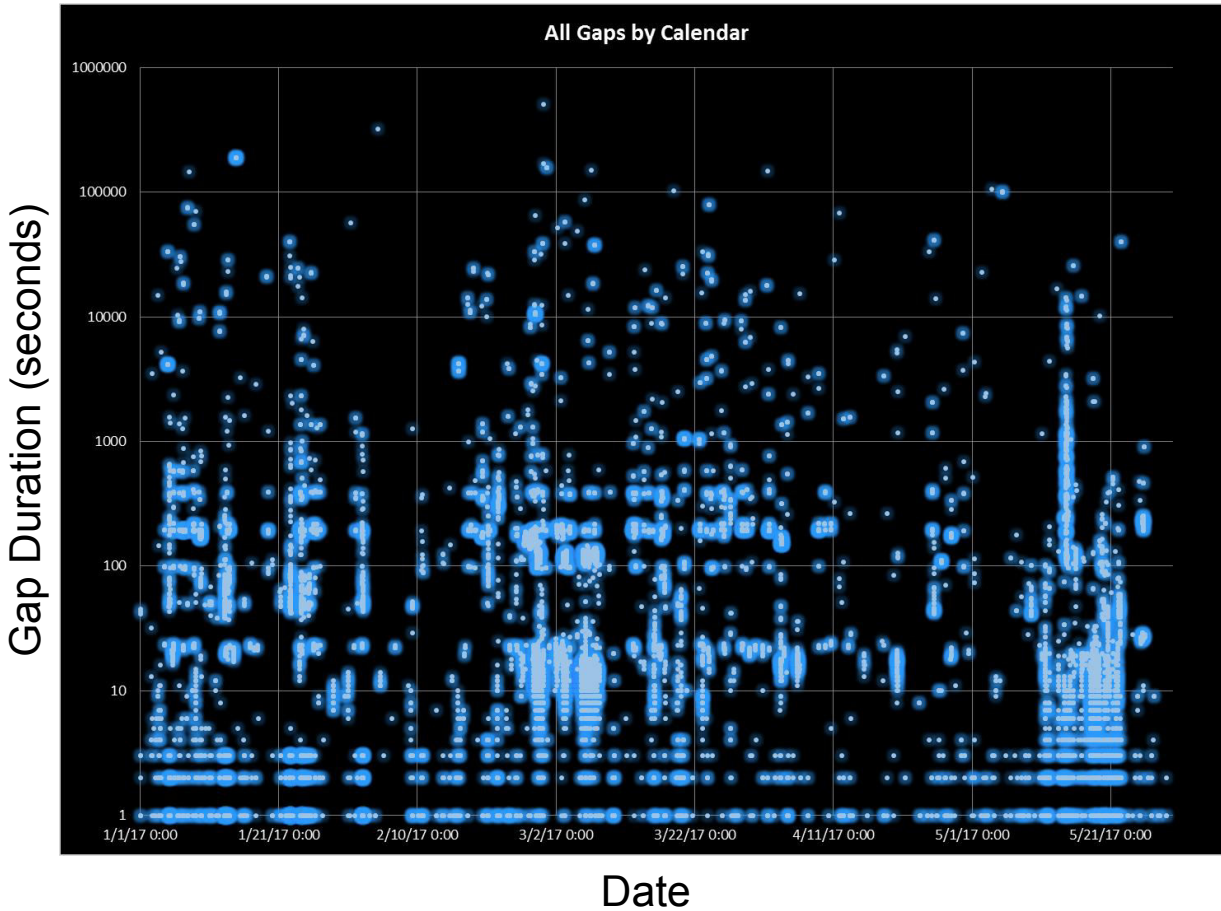
- Recorded network gaps every 24 hours
- Documented gap characteristics
- Supplemented gap data with status of health metrics
- Correlated gap data to maintenance actions
- Data Set
 - 25 stations
 - 15,500 data gaps (48% of gaps between 1-10 second duration)
 - Required actions (weatherproofing, software, radio configuration)
- Model future network performance



First Look

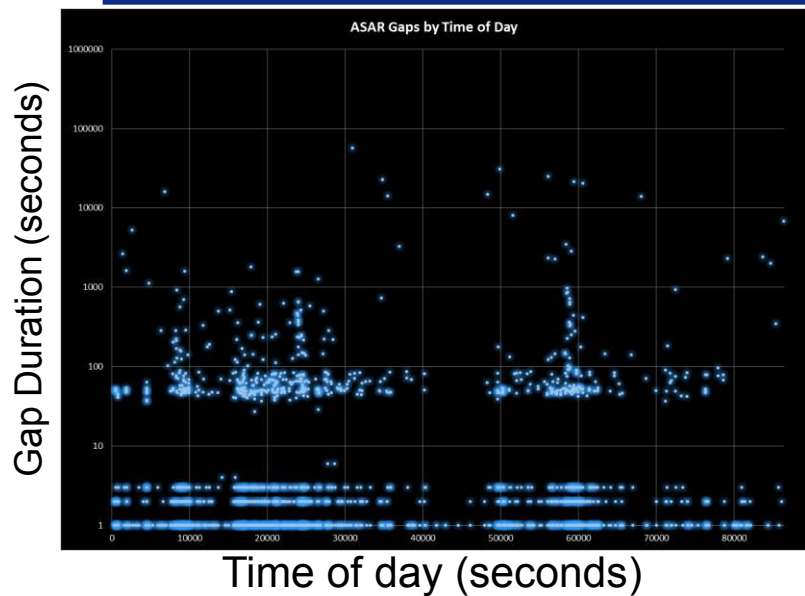


- Wide spread over time/duration
- 1, 10, 100 second groupings

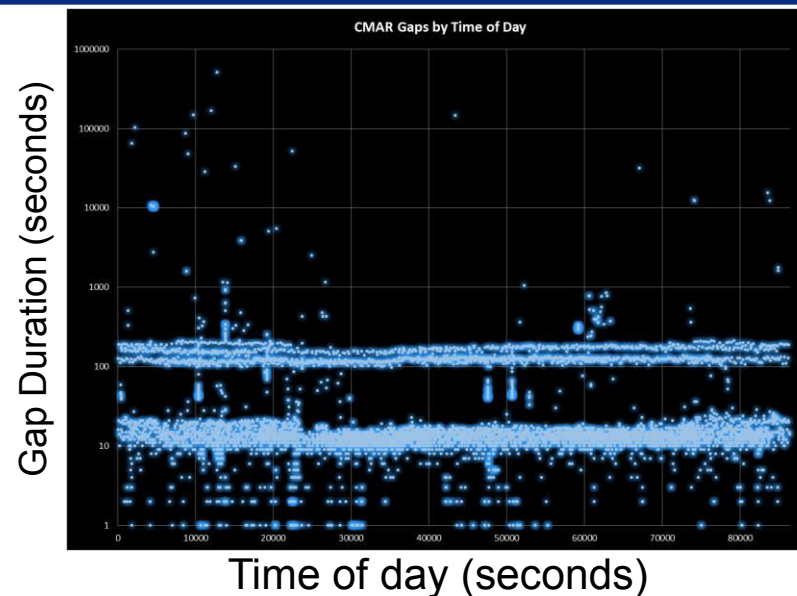




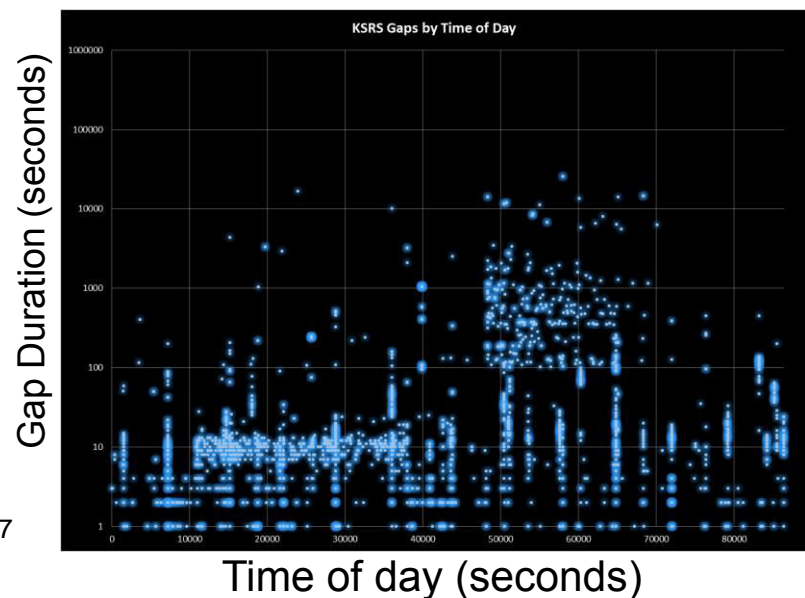
Gaps



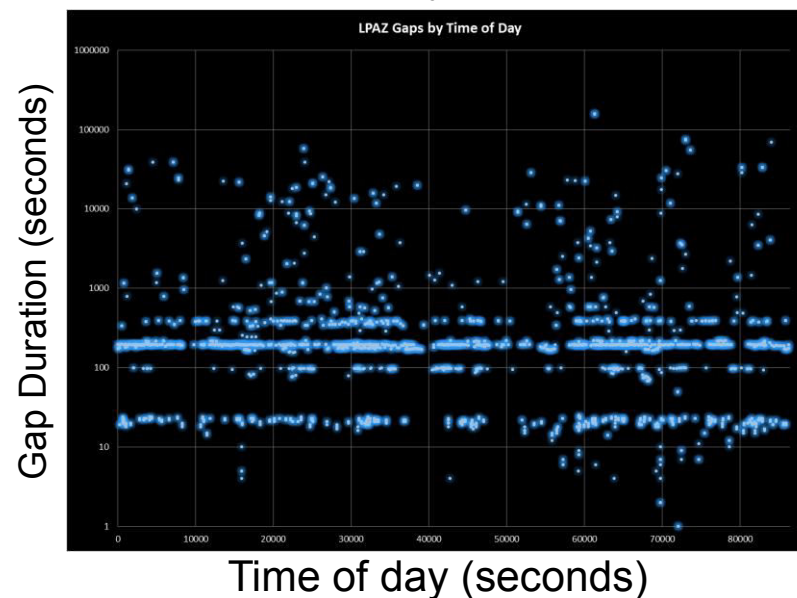
ASAR



CMAR



KSRS



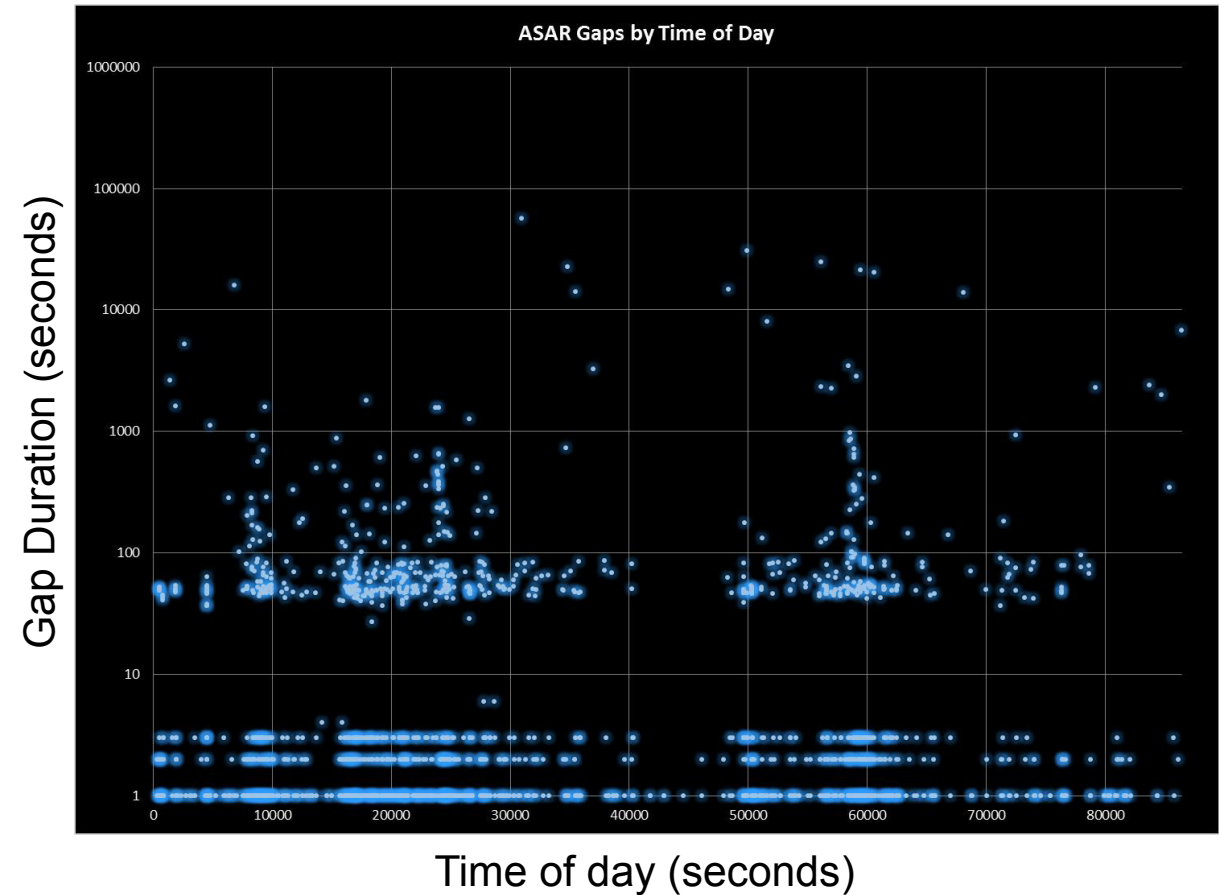
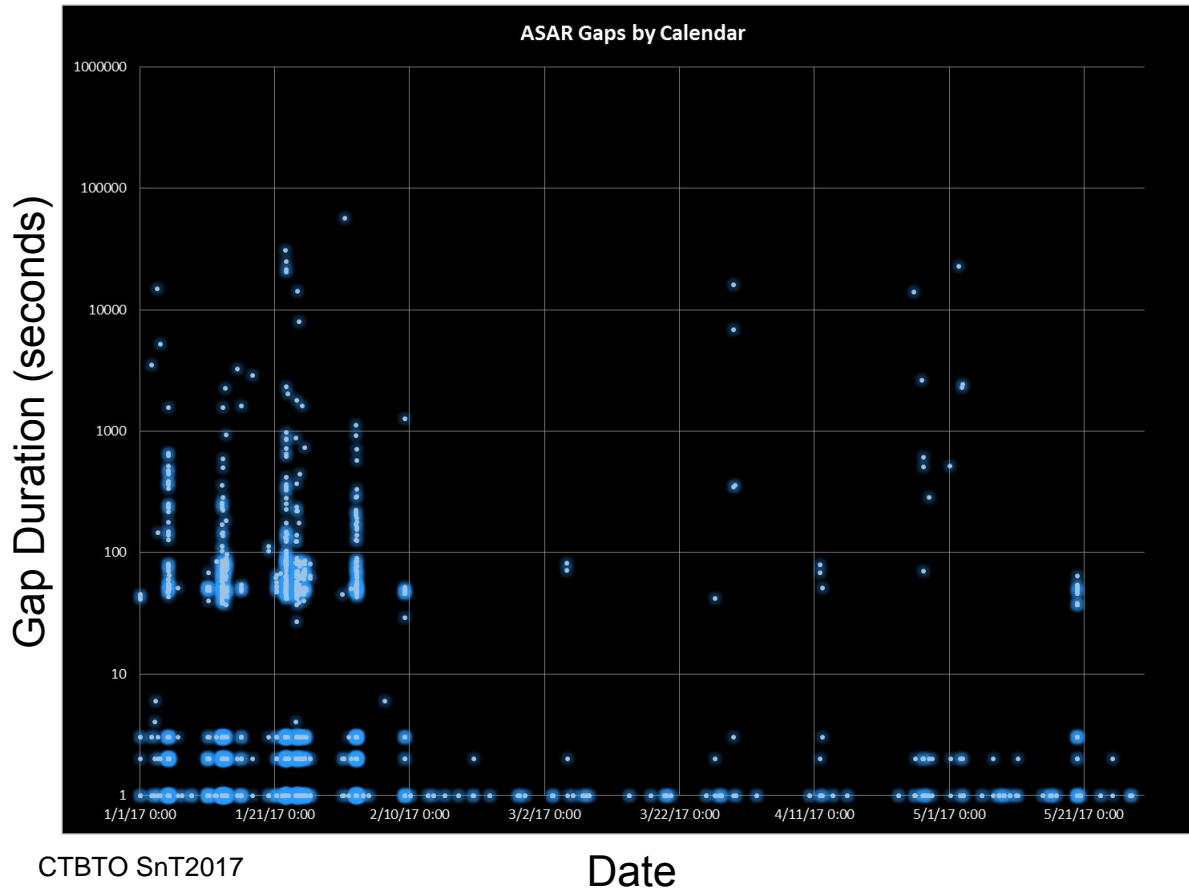
LPAZ



ASAR Analysis



- Groupings on specific dates
 - Look for something with a daily cycle

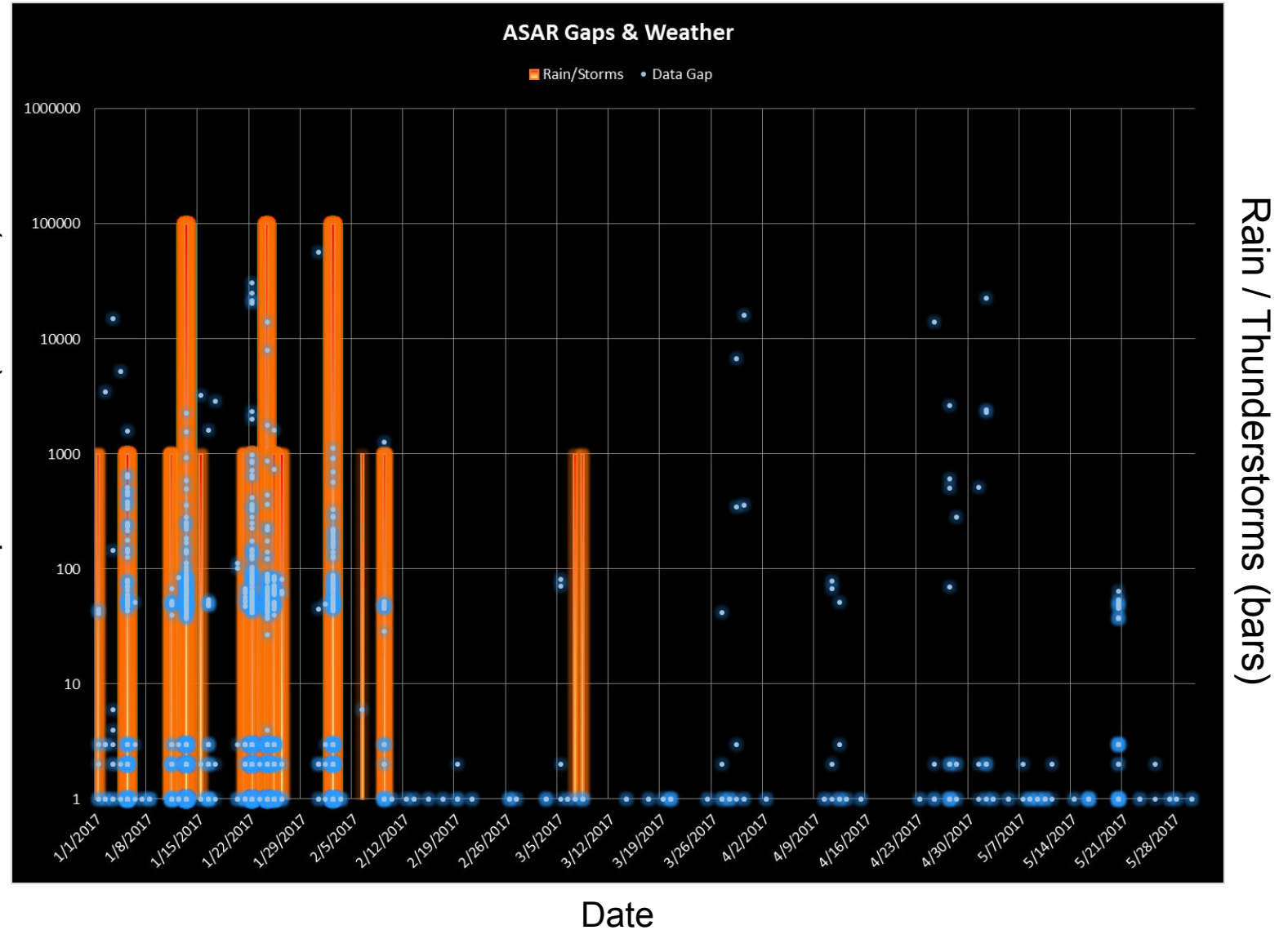




ASAR Analysis



- Downloaded weather data
 - Rain/Thunderstorms
- Is the problem array wide or specific sites?
- More gaps on AS13, AS15, AS07
- Action: Improve weatherproofing
- Unique equipment at these sites?

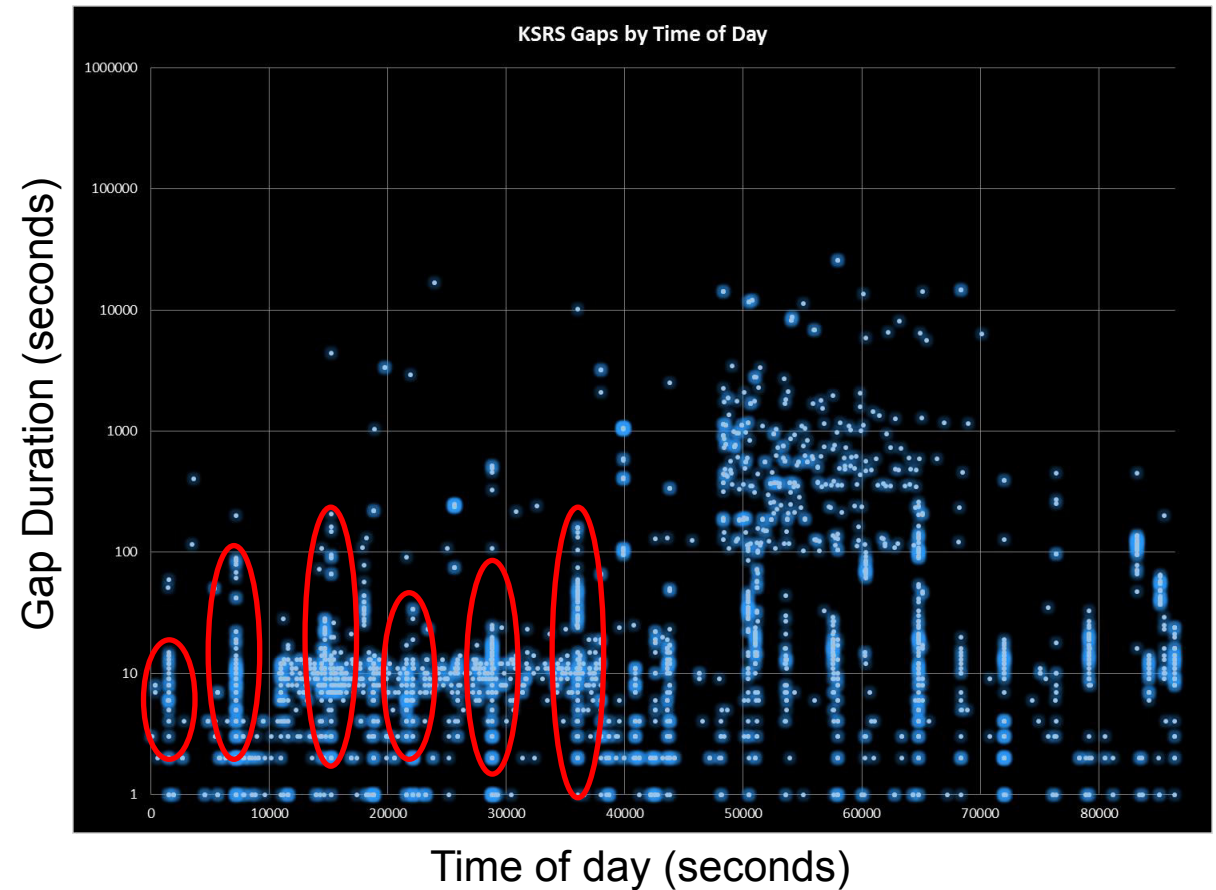
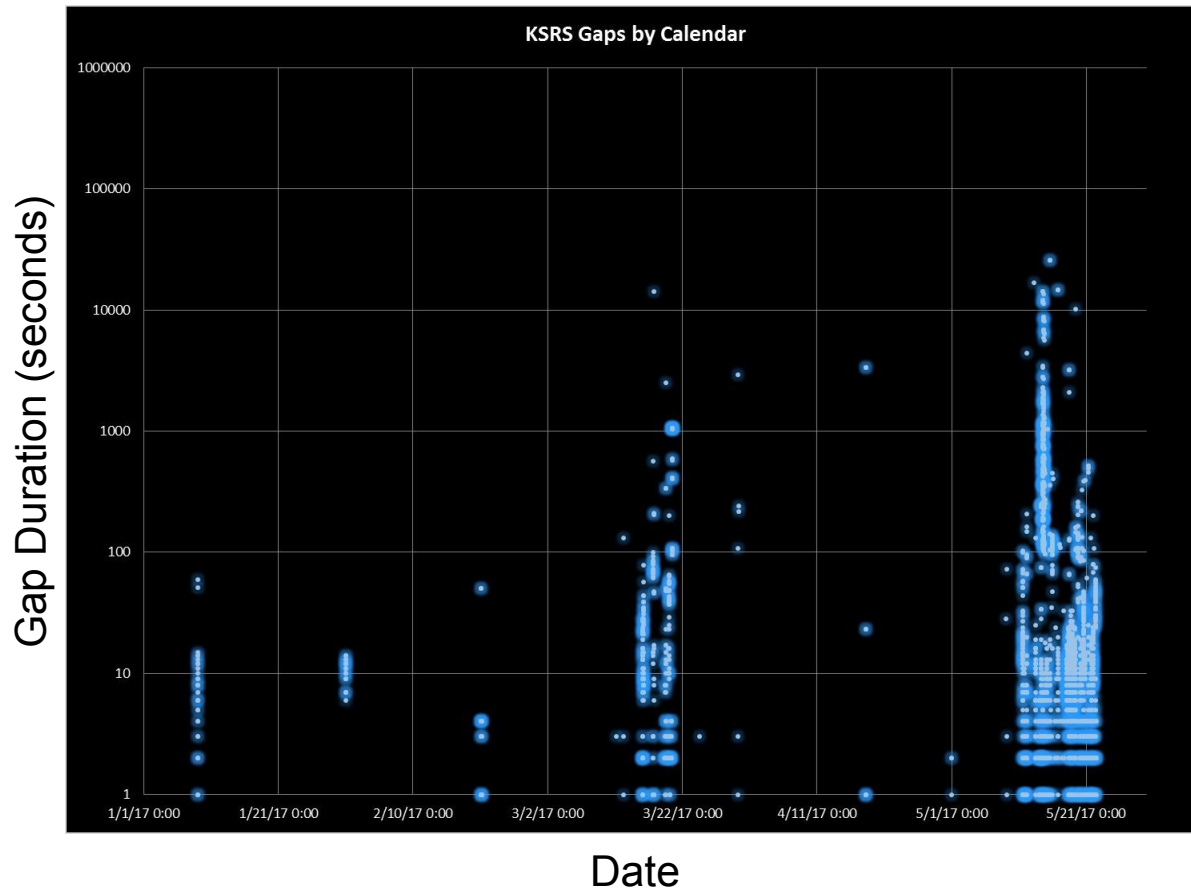




KSRS Analysis



- Groupings on specific times of the day
 - Software issue, buffer, timer, automated process





KSRS Analysis



- No correlation to radio network topology
- Look at aggregation point
- Problem found with combiner unit's software

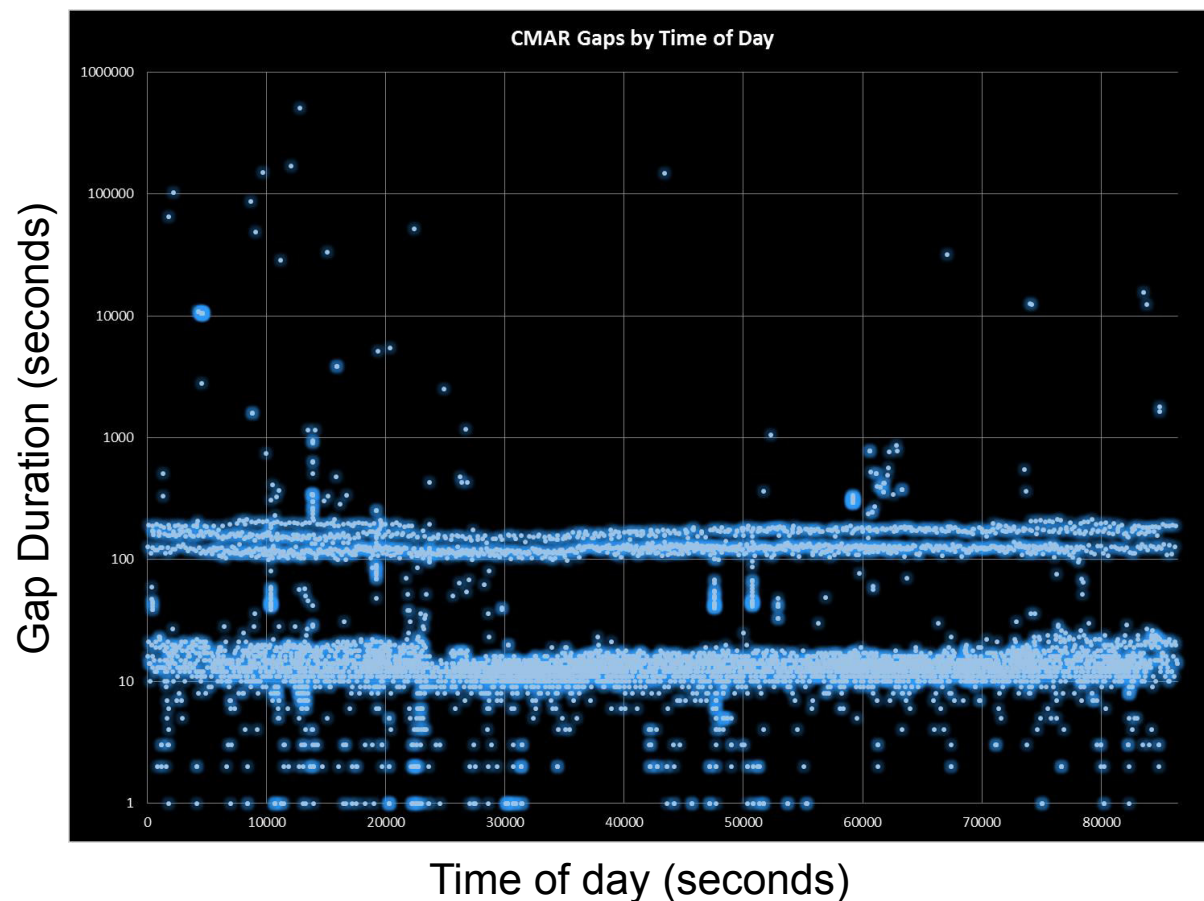
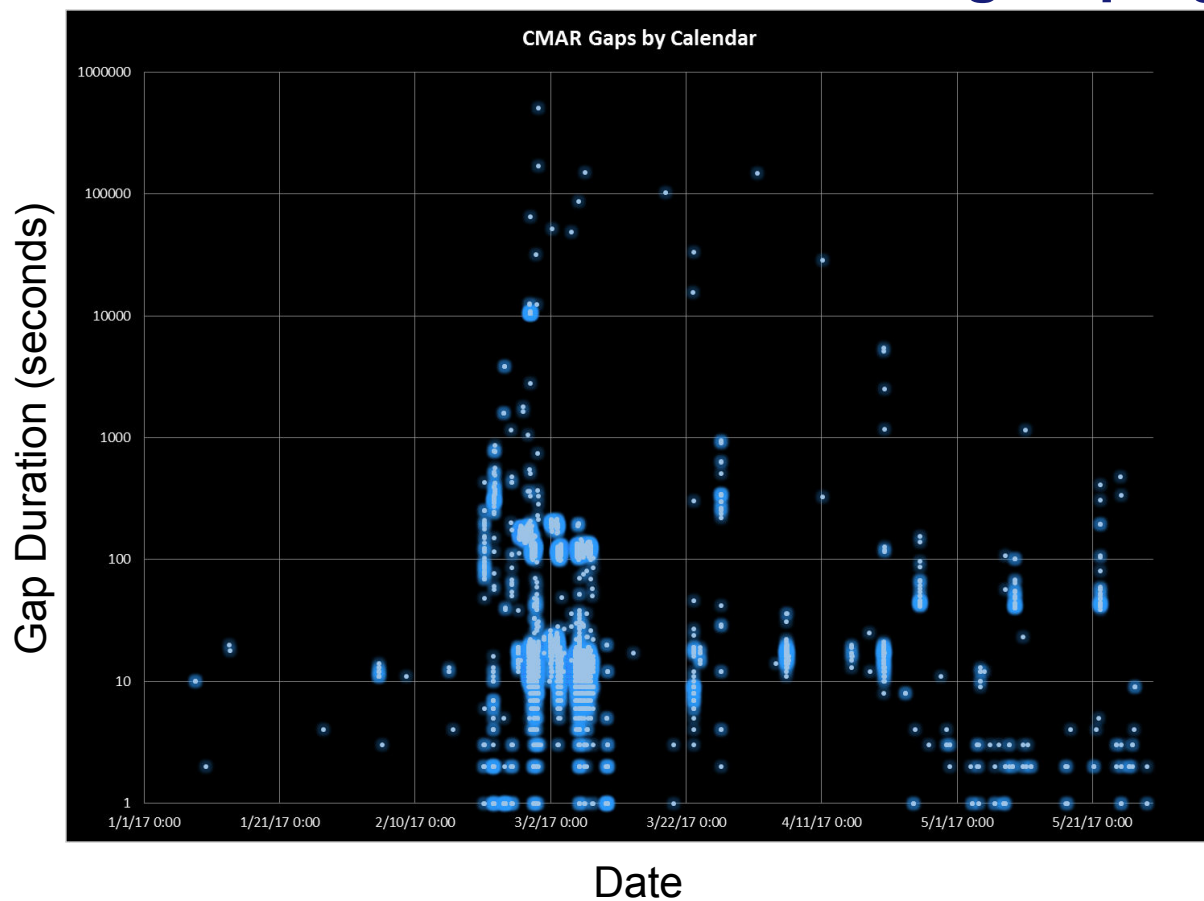




CMAR Analysis



- Groupings on duration of gap over the day
 - 10 second and 100 second groupings

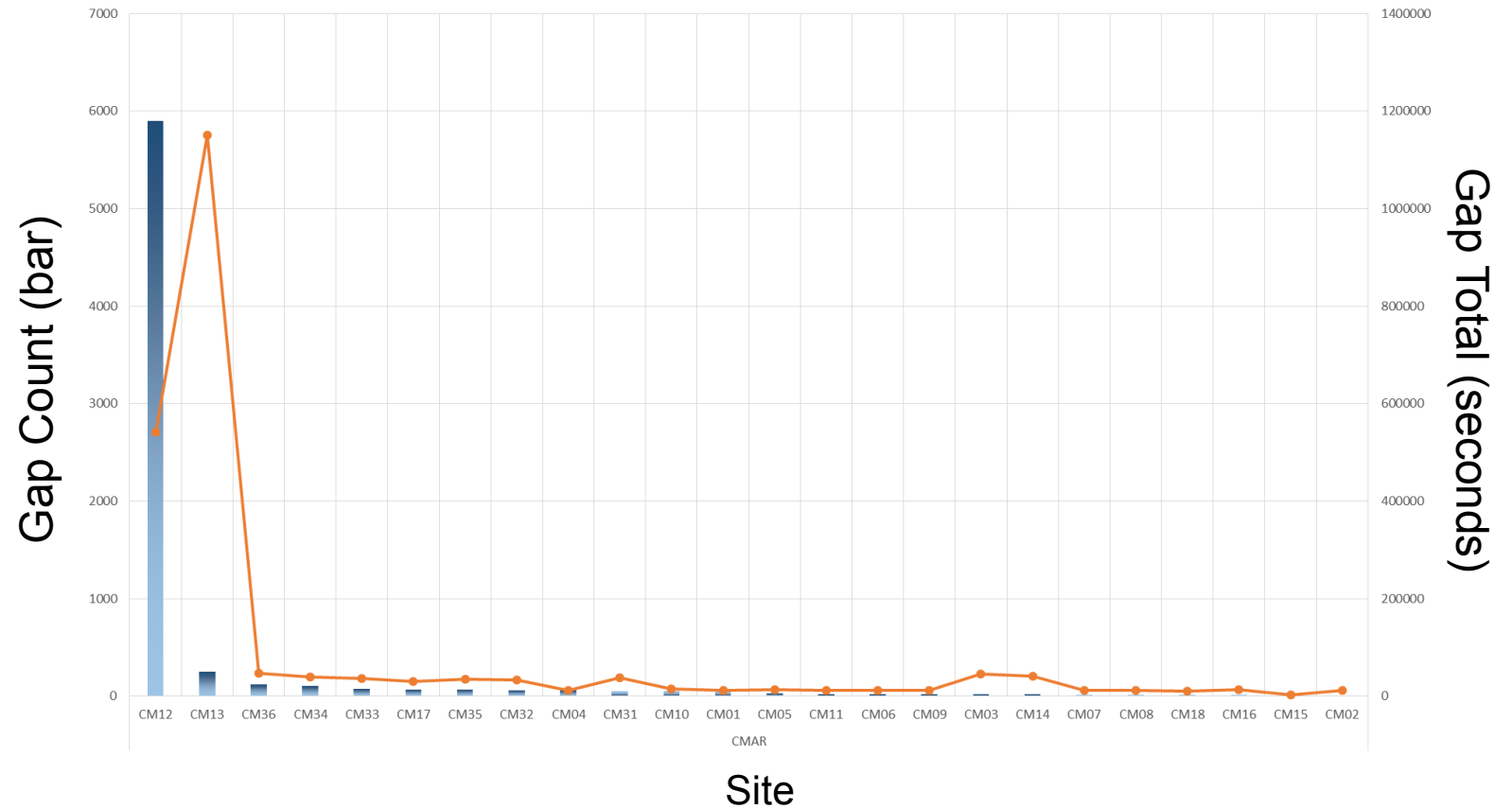




CMAR Analysis



- Gaps concentrated on CM12
- Issue indicated communications problem
 - Too deep in network
 - Needed more retransmits
 - Signal strength was good
- Radio configuration change fixed the problem





Projecting Network Performance



Station	Availability	Probability Impact		
		Reliability (24 Hrs.)	MTTR (Hrs.)	Std Dev (MTTR)
ABKAR	99.99%	0.9896	0.2264	0.3376
ALMAR	99.98%	0.7114	0.0175	0.0045
ASAR	99.92%	0.6966	0.0558	0.0700
BCAR	99.23%	0.9776	8.1919	1.2682
BMAR	85.47%	0.9711	139.0768	612.6374
BOSA	99.37%	0.9509	2.9973	0.7627
BRTR	100.00%	0.9998	0.0003	0.0001
BURAR	100.00%	0.9967	0.0007	0.0006
CBAR	99.99%	0.9977	1.1251	0.3060
CMAR	99.79%	0.5561	0.0856	0.2726
CPUP	100.00%	0.9983	0.0003	0.0002
DBIC	90.08%	0.7426	8.8754	0.3078
DOMAR	99.99%	0.9757	0.1134	0.0365
ERMAR	100.00%	0.9934	0.0024	0.0003
FLAR	100.00%	0.9745	0.0173	0.0081
H08A	58.10%	0.7213	52.9862	1937.1074
H10A	97.41%	0.5077	0.9421	11.8864
H11A	99.54%	0.9509	2.1943	0.4603
ILAR	99.96%	0.9558	0.2063	1.3139
IMAR	100.00%	0.9868	0.0022	0.0005
KKAR	100.00%	0.9804	0.0593	0.1208
KSRS	99.90%	0.7296	0.0784	0.0553
LBTB	99.80%	0.7337	0.1590	0.1066
LPAZ	98.47%	0.4061	0.4138	0.3381
MDAR	100.00%	0.9956	0.0003	0.0001
MKAR	99.97%	0.9773	0.3509	0.1179
MKIAR	99.66%	0.9711	2.8078	0.0924
PDAR	99.86%	0.9729	1.2052	0.7684
PLCA	98.82%	0.9322	4.0906	0.2828
TT	100.00%	0.9934	0.0000	0.0000
TXAR	98.55%	0.9922	44.9621	7.5711
VNDA	100.00%	0.9934	0.0000	0.0000
Grand Total	98.51%	0.7835	1.4921	411.9963



■ ASAR Example

- Good availability – so what?
- Low probability to run gap free in 24 hours
- Gap duration small
- Minimal variance in gap duration



Decision Modeling – Variables



- **Capability** – What monitoring capability does the station give you?
- **Cost** – How much does it cost to sustain the station?
- **Performance** – What is the probability the station will perform gap free for some period of time?
- **Impact** – What is the average gap duration and variance?
- **Events** – How many events has the station detected for some period of time?



Summary



- **Gap analysis identified current network issues**
- **Results used to develop targeted SOH data gathering**
- **Gap information goes beyond data availability metrics**
- **Enables development of network performance models**
- **Allows for “what if” scenarios analysis**
- **Optimize performance while reducing sustainment costs**