

Broward County  
Phase 3 Summary  
on  
911 Workload & Staffing Needs

Briefing for Stakeholders  
January 16-18, 2018

# Executive Summary

- As has been identified before, Broward's 911 efforts over the past years has been less of a consolidation, and more of a co-location. That premise best characterizes the reason why sought-after efficiencies have yet to be fully obtained
- In this Report, a focus was placed on the primary radio channels for both fire and law - and modelling their performance in a true consolidated environment. Base levels of service were identified - and limits identified where additional resources are required.

# Executive Summary (con't)

- The results show that consolidation of certain radio channels can occur completely for certain fire radio channels. In addition, both fire and law radio channels have an opportunity to consolidate overnight when workload drops significantly - though each is handled differently based on their specific needs.
- Finally, three law radio channels were found to exceed recommended workloads, and therefore resources are shifted from nighttime hours to daytime hours when needed.

# Executive Summary (con't)

- Overall, the total demand for staffing of call-take, radio & supervisor positions can be reduced up to 8.4% because of these consolidations. This translates to an estimate reduction on FTEs required to staff positions from a current level of 404 positions for front line dispatch center staff, to a level just between 360 to 370 FTEs.
- Because of current vacancies, and the estimated 1-year plus implementation schedule, no layoffs should be needed to achieve these efficiencies.

# Executive Summary (con't)

- Stakeholder input from earlier engagements were considered and addressed in the Report. This included:
  - Inclusion of all relevant radio channels in the analysis
  - Consideration of Priority 1 & 2 law enforcement calls by hour of day
  - Consideration of differences in demand overnight between fire and law enforcement

- Comparison of 'time-on-task' required in this Phase 3 report, versus those summarized in the Phase 2 report, shows some degree of variance. Phase 2 reflected a more aggressive reduction in 'time-on-task' was possible.
- The difference is explained by a number of factors - most significant is the change in perspective from the 3 PSAPs used in Phase 2, versus the 28 channels used here. The loss in efficiency is almost exponential when changing the lens from 3 dimensions to 28 dimensions - from a more global to more granular perspective. Nonetheless, there is still a significant efficiency that is identified in this more detailed analysis.

# Phase 2 Recommendations

## Status

Number	Recommendation - Phase 2	Current Status
15	Dispatch center performance metrics should focus on optimizing dispatch processes as much as possible	COMPLETED:
10	Modify the current monthly performance report	COMPLETED:
14	P2 and P3 intervals should be reported separately and as a combined metric.	COMPLETED:
1	The County needs to insure the missions of technology development and technology sustainment have different focuses and roles.	COMPLETED:
11	The "busy hour" is to be redefined	COMPLETED:
21	Long-term capital budgeting for two new purpose-specific 911 facilities.	COMPLETED:
12	The County should purchase a performance measurement software package	IN PROGRESS:
2	Link between 911 phone records and the associate CAD incident records.	IN PROGRESS:
5	Operational Oversight and System Governance	IN PROGRESS:
7	Supervision at a ratio of six to one	IN PROGRESS:
8	Resources for dispatcher training should be increased	IN PROGRESS:
13	Only the performance on emergency/ 911 incidents should be included in the performance reports.	IN PROGRESS:
16	Call processing staffing should be adjusted to achieve P1/call-taking performance of between three to five seconds at the 90 <sup>th</sup> percentile	IN PROGRESS:
3	Emergency Fire Dispatch	IN PROGRESS:
4	Emergency Police Dispatch	IN PROGRESS:
17	Fire-Rescue Nearest Unit Response	PENDING:
6	Alternative work schedules	PHASE 3 DELIVERABLE:
9	"Base level of 911 services" funded by the County should be more clearly defined	PHASE 3 DELIVERABLE:
18	Increased usage of Mobile Data Terminals (MDTs) by field responders.	PHASE 3 DELIVERABLE:
19	Single "gatekeeper" function / fire rescue alert channel	PHASE 3 DELIVERABLE:
20	Law enforcement radio positions should be consolidated	PHASE 3 DELIVERABLE:

# Methodology

- Used existing CAD data to quantify the demand on the 28 primary radios channels (9 fire & 19 law)
- Used radio data - focusing on radio talk time as the primary metric for the 28 primary radio channels
  - Analyzed each primary fire & law channel separately, calculating variables for each.
  - Conducted analysis for hour of day - for each radio channel
- For each channel we generated the following . . . .



# Methods

- For this analysis, we focused on:
  - Erlangs
  - Answer Delay @ 97<sup>th</sup>%

## Broward E911 Consolidated Communications System Radio Channel Performance by Hour-of-Day

Year	TalkGroup ID# & Discipline	Channel Name	PSAP	Surge
2015	80002631 LAW	PPP-MAIN	South	+ 0.00 0

S E R V E R	Hour of Day	Radio Channel Traffic			Workstation Staffing & Performance			
		Incidents	Xmit/Rcv	Σ Erlangs	OnTask	Immediate Answer [%]	Ans Delay @ 97 <sup>th</sup> %-tile [sec]	
	0000	4.52	102.02	0.224	1	77.58	4.77	
	0100	3.53	79.61	0.175	1	82.50	3.50	
	0200	2.74	61.77	0.136	1	86.43	2.59	
	0300	3.06	69.12	0.152	1	84.81	2.96	
	0400	2.47	55.68	0.122	1	87.76	2.30	
	0500	2.33	52.57	0.116	1	88.45	2.16	
	0600	2.70	61.01	0.134	1	86.59	2.56	
	0700	4.50	101.61	0.223	1	77.67	4.75	
	0800	5.85	132.06	0.290	1	70.98	6.75	
	0900	6.62	149.38	0.328	1	67.17	8.07	
	1000	7.14	161.08	0.354	1	64.60	9.04	
	1100	8.36	188.56	0.414	1	58.56	11.68	
	1200	8.55	192.97	0.424	1	57.59	12.15	
	1300	8.85	199.70	0.439	1	56.11	12.91	
	1400	8.99	202.79	0.446	1	55.43	13.27	
	1500	9.51	214.54	0.471	1	52.85	14.72	
	1600	8.66	195.48	0.430	1	57.04	12.43	
	1700	8.53	192.35	0.423	1	57.73	12.08	
	1800	8.45	190.55	0.419	1	58.12	11.89	
	1900	7.35	165.89	0.365	1	63.54	9.47	
	2000	6.53	147.41	0.324	1	67.60	7.91	
	2100	6.01	135.67	0.298	1	70.19	7.01	
	2200	5.50	124.14	0.273	1	72.72	6.19	
	2300	5.01	113.11	0.249	1	75.14	5.46	
Avg Air-Time per Xmit/Rcv		Hourly Averages			Average Erlangs			
7.911 sec		0.00	6.07	137.04	0.301	Req'd Hrs OnTask	Wt'd 24 Hr % Immed Ans	Wt'd 24 Hr Ans Delay
					24	65.38 %	9.31	

	Hours Included in Block			Parameters Weighted Over Block Lengths	
	From First	Thru Last	Block Length	% Immed Ans	Ans Delay @ 97 <sup>th</sup> %-tile [sec]
Contiguous	0000	2300	24	65.38 %	9.31
non-Contig			0	? %	?

Consolidations
BSO-10P-DISP

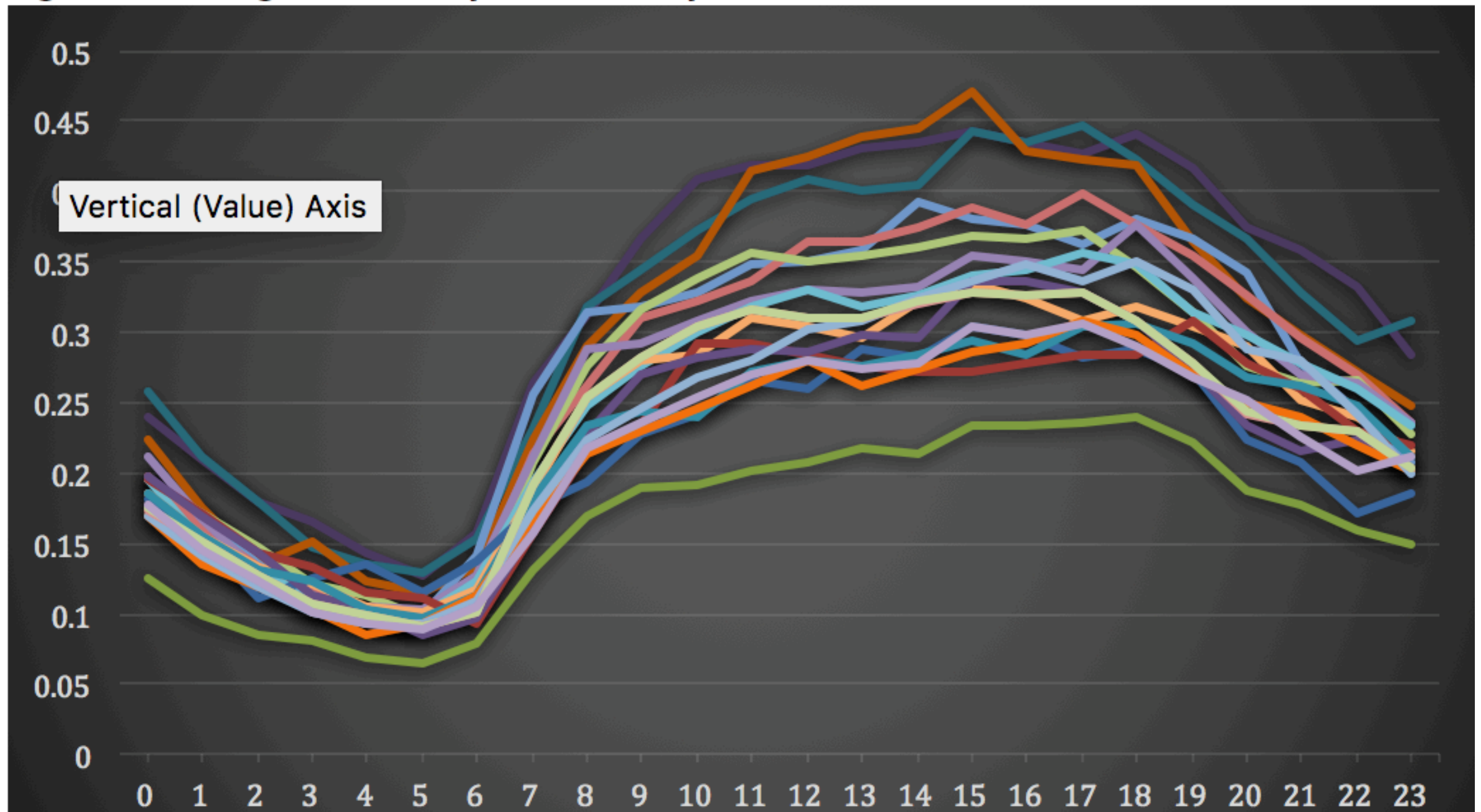
# Figure 4: Main Radio Channels - Law

Broward E911 Consolidated Communications System Talkgroups at Zone Statistics CY2015									
Discipline & TalkGroup ID ##	Channel Abreviation	Annual Air-Time [sec / yr]	Annual Incidents	Annual Xmit/Rcv's [PPT/2]	Air-Time per Xmit/Rcv [sec]	Xmit/Rcv's per Incident	Air-Time per Incident [sec]	Agencies Served	
LAW	80001635	SNP-DISP	7,195,082	38,282	1,759,000	8.181	22.97	187.95	Agn42
LAW	80002673	CKP MAIN	8,310,381	43,586	1,999,228	8.314	22.93	190.67	Agn30 + Agn37
LAW	80001825	FLP-DIST-1	8,304,910	52,978	2,010,966	8.260	18.98	156.76	0.333* Agn34 + Agn43
LAW	80001827	FLP-DIST-2	7,388,925	45,056	1,828,597	8.082	20.29	163.99	0.333* Agn34
LAW	80001829	FLP-DIST-3	7,398,485	45,055	1,844,836	8.021	20.47	164.21	0.333* Agn34
LAW	80003311	HWP-A1	9,798,831	42,174	2,248,559	8.716	26.66	232.34	0.5933 * Agn33
LAW	80003331	HWP-A2	6,716,101	28,906	1,503,949	8.931	26.01	232.34	0.4067 * Agn33
LAW	80002631	PPP-MAIN	9,362,099	52,454	2,366,789	7.911	22.56	178.48	Agn25
LAW	80000277	BSO-09-DISP	6,811,261	34,030	1,728,784	7.880	25.40	200.15	Agn10
LAW	80000423	BSO-11-Area2	6,705,586	37,523	1,628,181	8.237	21.70	178.71	0.5145 * Agn11
LAW	80000259	BSO-02-DISP	6,571,478	37,318	1,601,387	8.207	21.46	176.09	Agn02 + Agn 03 + Agn14
LAW	80000261	BSO-03-DISP	7,212,269	41,993	1,799,881	8.014	21.43	171.75	Agn28 + 0.4485*(Agn19 + Agn01)
LAW	80000263	BSO-04-DISP	4,794,358	27,915	1,188,048	8.071	21.28	171.75	Agn16+Agn08+0.5515* (Agn19 + Agn01)
LAW	80000269	BSO-06-DISP	7,364,307	42,650	1,719,839	8.564	20.16	172.67	Agn29
LAW	80000273	BSO-07-DISP	10,128,828	58,808	2,552,006	7.938	21.70	172.24	AgnBS + Agn04 + Agn12
LAW	80000275	BSO-08-DISP	7,975,457	46,725	1,923,523	8.293	20.58	170.69	Agn07 + Agn15 + Agn17
LAW	80000279	BSO-10-DISP	8,527,021	63,054	2,179,866	7.823	17.29	135.23	Agn23
LAW	80000421	BSO-11-Area1	7,851,381	43,935	1,894,712	8.288	21.56	178.70	0.4855 * Agn11 + Agn 13 + Agn36 + Agn26
LAW	80000265	BSO-05-DISP	7,145,394	62,913	1,726,000	8.280	13.72	113.58	Agn21

# Figure 3: Main Radio Channels - Fire

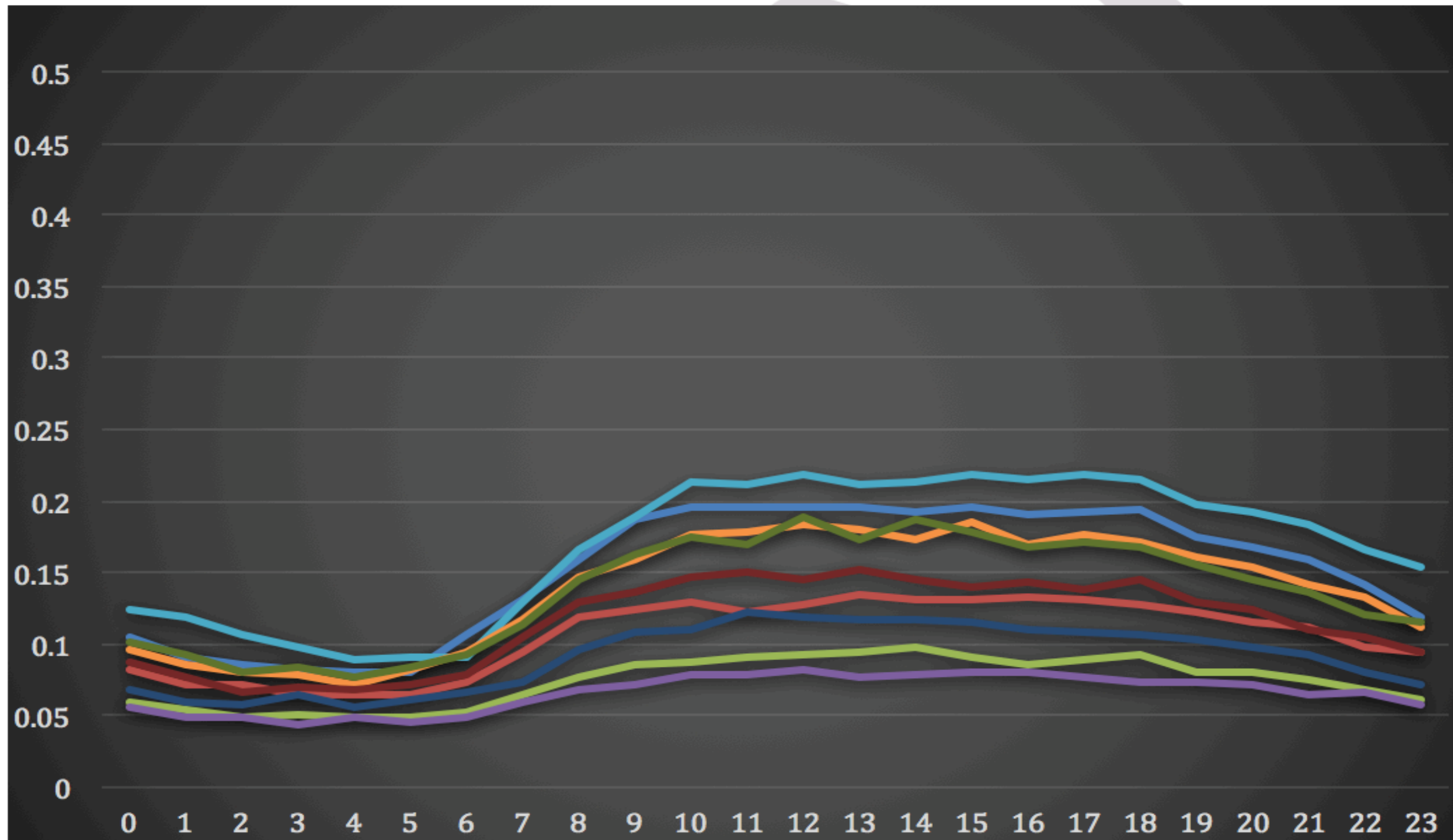
Broward E911 Consolidated Communications System Talkgroups at Zone Statistics CY2015									
Discipline & TalkGroup ID ##		Channel Abreivation	Annual Air-Time [sec / yr]	Annual Incidents	Annual Xmit/Rcv's [PPT/2]	Air-Time per Xmit/Rcv [sec]	Xmit/Rcv's per Incident	Air-Time per Incident [sec]	Agencies Served
FIRE	80001651	BCF-D1	4,161,542	32,237	1,011,799	8.226	15.69	129.09	OP + SN + LH
FIRE	80000513	BCF-D2	4,671,511	43,740	1,124,710	8.307	12.86	106.80	CC + DN + DR + BC + LL + PK + PE + WP +
FIRE	80000517	BCF-D3	2,008,058	18,675	433,026	9.275	11.59	107.53	HD + MM
FIRE	80000577	BCF-D4	1,539,092	12,800	334,737	9.196	13.08	120.24	DV + SW
FIRE	80000515	BCF-D5	3,160,509	28,086	748,747	8.442	13.33	112.53	LS + LP + PB
FIRE	80002687	BCF-D6	3,456,751	29,639	830,850	8.321	14.02	116.63	CK + MG + NL + TM
FIRE	80001569	FLF-DISP1	5,252,965	49,611	1,298,906	8.088	13.09	105.88	FL + WM
FIRE	80003359	BCF-D8	4,070,692	28,239	940,253	8.659	16.65	144.15	HW
FIRE	80002655	BCF-D9	2,525,851	20,478	628,383	8.039	15.34	123.34	PP

**Figure 8: Erlang Demand by Hour of Day – Law Enforcement Main Channels**



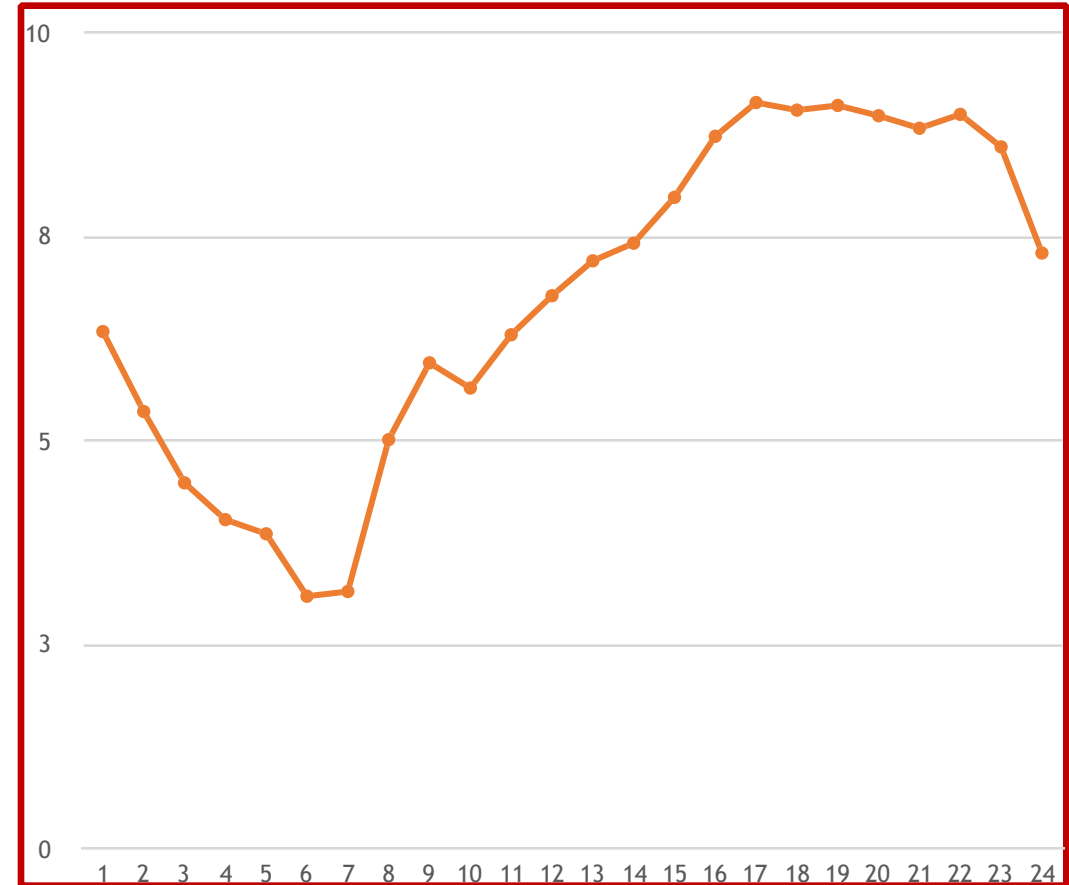


**Figure 9: Erlang Demand by Hour of Day – Fire Main Channels**



## Figure 2: Law - Average Priority 1 & 2 Calls by Hour of Day

- During this engagement, questions arose regarding the frequency with which high priority law enforcement calls occur by hour of day. The concern was any impact higher priority incidents may have should radio channels be reduced during overnight hours.
- CAD data was also examined to answer this question and is reflected in the graphic below. As can be seen, most significant law incidents, as defined as Priority 1 & 2, occur between noon and midnight hours.



# Grade of Service & Hold Time

- The Grade of Service (GOS) for systems with queues is the probability of a response to a call being delayed by busy radio dispatchers.
- What is recommended in the context of the Broward's radio channels is that responses to 97% of field initiated transmits be responded to by the radio dispatcher in less than the duration of the average Xmit/Rcv cycle on the channel, or within 10 seconds.

# Figure 23: Base Levels of Service

Quantitative	
911 call answer performance	Call intake staffing should be adjusted to achieve P1/call-taking performance of between three to five seconds at the 90 <sup>th</sup> percentile
Radio operator (law & fire) workloads	A single radio talkgroup, staffed with a single radio operator, should not exceed during any 4-hour block a weighted 0.4 Erlangs <u>and</u> during that same 4-hour block a weighted Answer Delay of 10 seconds or greater
PSAP supervision levels	Supervision on the PSAP dispatch floors should be scheduled at a ratio of six to one.
Qualitative	
Call-taking	The system should maintain EMD certification for all call takers through the International Academies of Emergency Dispatch (IAED), and implement and achieve certification in both EFD and EPD.
Radio operators	Independent QA/QI for call-taker, fire and law positions should be addressed through existing MPDS systems or similar methodologies.



# Recommended Changes to Radio Channels

**Figure 11: Recommended Changes in Radio Channel Staffing**

<b>FIRE Radio Main Channel Staffing</b>	<b>Current</b>	<b>Recommendation</b>	<b>% Change</b>
Current - 9 talkgroups staffed 24-hours per day	216		
FLF-DISP1 Fort Lauderdale remains unchanged from current		24	
BCF-D3 (Hallandale/Miramar) & BCF-D4 (Davie) consolidate for 24-hours per day		24	
BCF-D5 (Lighthouse Point/Pompano) & BCF-D6 (Margate/Coconut Creek/N. Laud./Tamarac) consolidate for 24-hours per day		24	
BCF-D8 (Hollywood) & BCF-D9 (Pembroke Pines) consolidate for 24-hours per day		24	
BCF-D1 (Sunrise/etc.) & BCF-D2 (BSO Fire) consolidate for 8-hours per day overnight (from 2300 till 0700)		40	
<b>Fire Total Staffing Hours/Day</b>	<b>216</b>	<b>136</b>	<b>-37.0%</b>

<b>LAW Radio Main Channel Staffing</b>	<b>Current</b>	<b>Recommendation</b>	<b>% Change</b>
Current - 19 talkgroups staffed 24-hours per day	456		
PPP-MAIN remains unchanged from Current		24	
CPK-MAIN remains unchanged from current		24	
Hollywood consolidates their 2 channels to a single channel for 6-hours per day overnight (from 0100 till 0700)		42	
Fort Lauderdale consolidates their 3 channels to 2 channels for 6-hours per day overnight (from 0100 till 0700)		66	
BSO-06-DISP (Lauderhill) & SNP-DISP (Sunrise) for 6-hours per day overnight (from 0100 till 0700)		42	
BSO-11-Area1 & BSO-11-Area2 (Pompano) consolidate to a single channel for 6-hours per day overnight (from 0100 till 0700)		42	
BSO-10-DISP (Miramar) & PPP-MAIN (Pines) for 6-hours per day overnight (from 0100 till 0700)		42	
BSO-08-DISP (N.Laud/Parkland/Tamarac) & BSO-09-DISP (Deerfield Beach) for 6-hours per day overnight (from 0100 till 0700)		42	
BSO-02-DISP (Dania/Ports) & BSO-05-DISP (Davie) for 6-hours per day overnight (from 0100 till 0700)		42	
BSO-03-DISP (Cooper City/Weston) & BSO-04-DISP (Pembroke Park/West Park) for 6-hours per day overnight (from 0100 till 0700)		42	
PPP-MAIN additional radio hours needed		8	
BSO-7 additional radio hours needed		8	
HWD-A1 additional radio hours needed		8	
<b>Law Total Staffing Hours/Day</b>	<b>456</b>	<b>432</b>	<b>-5.3%</b>

Figure 10: Gross Change in Radio Workstation Staffing - 24-Hour Period

Workstations	Hours	Notes
Fire - Current	216	9 radio positions X 24 hrs.
Fire - Modeled	136	6 radio channels X 16 hrs. and 5 radio channels X 8 hrs.
Law - Current	456	19 radio positions X 24 hrs.
Law - Modeled	432	22 radio positions X 8 hrs.; 19 radio channels X 10 hrs.; 11 radio channels X 6 hrs.

<b>Total of Fire &amp; Law Main Dispatch Channels</b>	<b>672</b>	<b>568</b>	<b>-15.5%</b>
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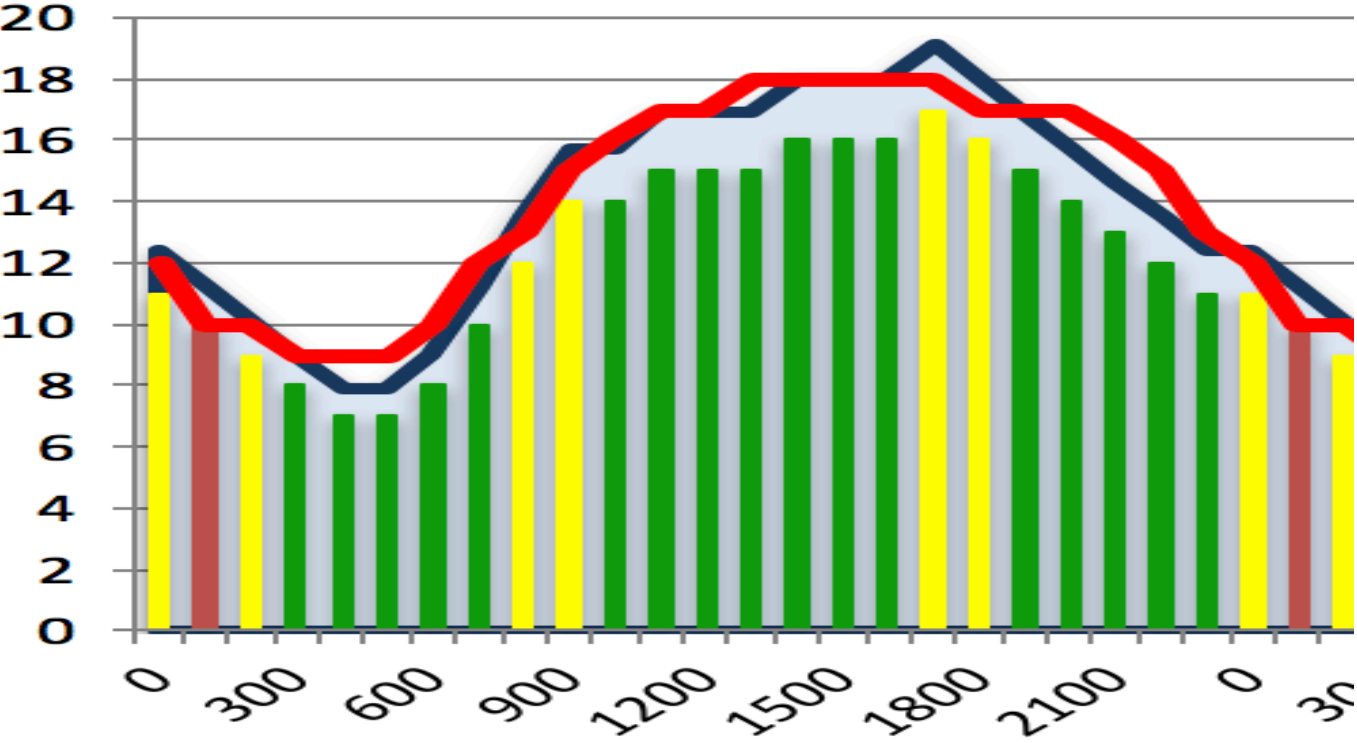
# Conversion of Model to Staffing & FTEs

Manpower Descriptor	Source
Dispatcher Hours on Task	Erlang modelling of the main radio dispatch workstations at the three PSAPs provides the needed number of hours of dispatchers actively on duty at their workstations.
Dispatchers on Shift	Calculated from dispatchers on task by providing for local work rules, break time policies while on shift, and local contractual obligations.
Full Time Equivalent (FTE) (Dispatchers on Staff)	Calculated from dispatchers on shift by providing for local personnel policies, work rules, and contractual obligations.

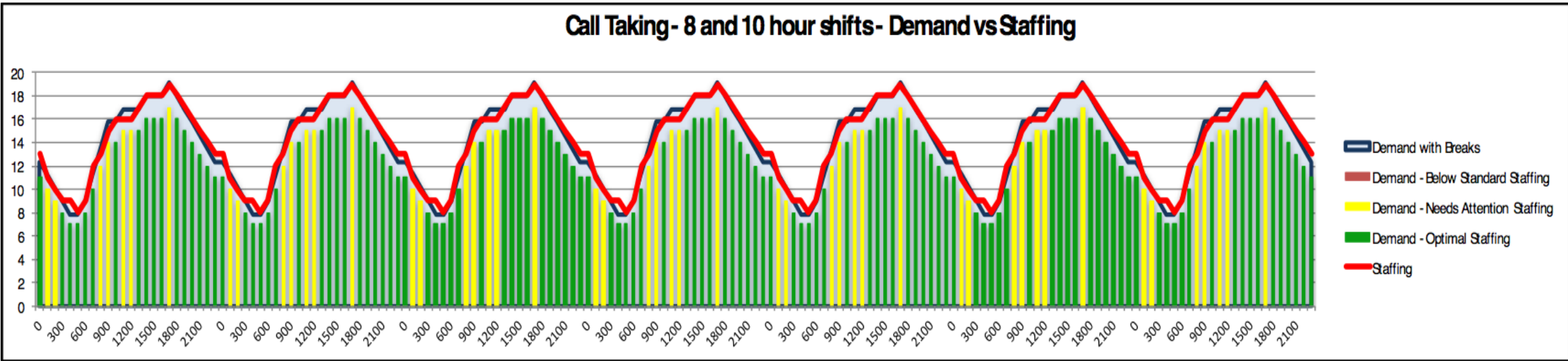
Worksheet A: Determining Employee Availability

Determine Net Available Work Hours (NAWH)	
Position:	
A	<u>2080</u> Total hours for one full time employee
B	<u>202</u> Average vacation and holiday leave (total hours)
C	<u>94</u> Average sick leave (total hours)
D	<u>11</u> Average personal leave (total hours)
E	<u>86</u> Average training leave (total hours)
F	<u>39</u> Average military, FMLA leave, etc. (total hours)
G	<u>264</u> Average lunch and break (total hours)
H	<u>3</u> Average other (meetings, light duty, special assignments, etc.)
I	<u>699</u> Total <u>unavailable</u> time = Total B through H
J	<u>1381</u> Net Available Work Hours (NAWH) = A - I
<u>1381</u> = Net Available Work Hours per employee (NAWH from J above)	

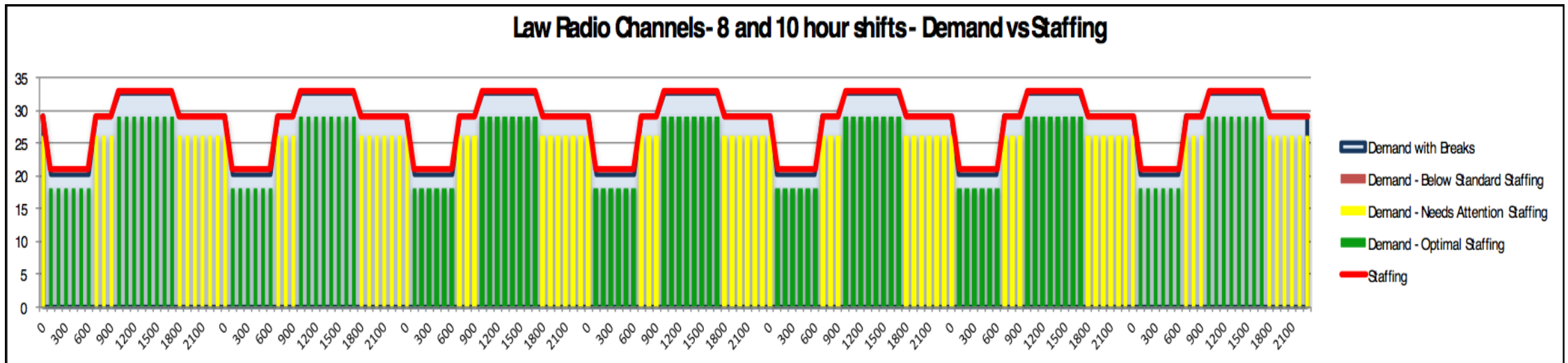
# Figure 17: Call Intake - 8 Hour Shifts Only



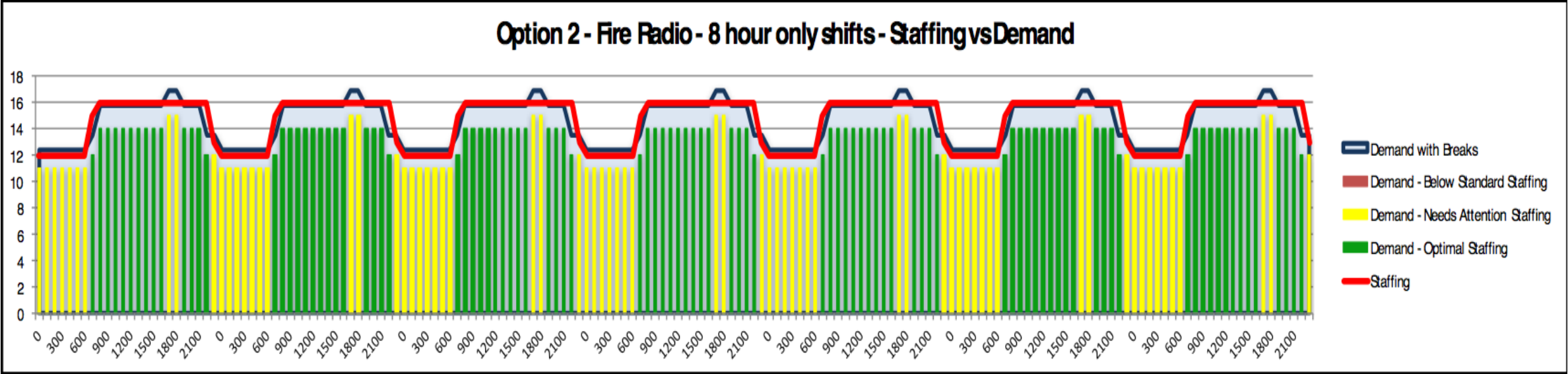
# Figure 18: Call Intake - 8 Hour and 10 Hour Shifts



# Figure 19: Law Workstations: 8 and 10 Hour Shifts



# Figure 21: Fire Workstations - Option 2 with 8 Hour Shifts





# FTE Requirements

- Currently, BSO's budget includes 404 FTEs assigned to these same roles.
- The results demonstrate the opportunity for efficiencies available in the current system

8-Hour & 10-Hour Shifts		Personnel Hours/Week	Scheduled Hours/Year	FTEs Required
Call Intake	Demand with Breaks	2370	1645	74.9
	Base Demand	2107	1645	66.6
	Suggested Staffing	2380	1645	75.2
Law	Demand with Breaks	4725	1645	149.4
	Base Demand	4200	1645	132.8
	Suggested Staffing	4760	1645	150.5
Fire - Option 1	Demand with Breaks	2205	1645	69.7
	Base Demand	1960	1645	62.0
	Suggested Staffing	2261	1645	71.5
Fire - Option 2	Demand with Breaks	2449	1645	77.4
	Base Demand	2177	1645	68.8
	Suggested Staffing	2449	1645	77.4
Supervisor	Demand with Breaks	1477	1645	46.7
	Base Demand	1477	1645	46.7
	Suggested Staffing	1568	1645	49.6
<b>Total FTEs - Fire Option 1</b>				<b>346.7</b>
<b>Total FTEs - Fire Option 2</b>				<b>352.7</b>









# *Total Implementation Schedule*

Radio programming needs to occur first . . .

. . . then, full implementation can begin.

• Call intake (includes defining and bidding new schedules)	2 months
• Fire workstations	4 months
• Law Workstations (added capacity)	1 month
• Law Workstations (overnight consolidation)	4 months
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Total Implementation	11 months

***Agencies can elect to 'buy' a higher level of service . . .***

Questions

