PSAP Comparisons

Public Safety Communications System Assessment and Design

Broome County, New York

Report

June 28, 2012

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1 Overview

This section compares Broome County's operation with that of the six PSAPs visited as part of this study. Although the sample size is small, it is interesting to see how Broome compares in staff loading, and especially the requirements for separate call takers. This is not meant as a detailed study, but an "in the ballpark" type of comparison.

The demographic information was taken from the US Census Bureau statistics. The date of these statistics is 2010.

Call center statistics were supplied by the agencies that were visited. Note that different communications centers sometimes have different ways of compiling statistics, so the numbers used are sometimes based upon interpolation of data. Some centers did not have detailed breakdowns for all categories requested. The numbers supplied were either from 2010 or 2011 depending upon what was available.

Broome County statistics were taken pre-flood to allow for a more normalized breakdown. Any major incident can skew numbers greatly, but show how much overhead may be needed during such major emergencies.

2 Demographics

2.1 Demographics

	Size (Sq. Miles)	Population	Population Density	Metro Areas
Broome County, NY	705.77	200,600	284.2	Binghamton
Saratoga County, NY	809.98	219,607	271.1	NYS Capital Region
Monroe County, NY	657.21	744,344	1132.6	Rochester
Lackawanna County, PA	459.08	214,437	467.1	Scranton
Dutchess County, NY	795.63	297,488	373.9	Poughkeepsie
Alexandria, VA	15.03	139,966	9312.4	Alexandria
Arlington County, VA	25.97	207,627	7994.9	DC Metro

Table 2-1: Demographics

Broome County compares most closely to Saratoga County in both area size and population. Dutchess County has a similar size, but has a one-third higher population density. Note that Dutchess County has 9-1-1 operations only. Saratoga County takes all wire line and wireless 9-1-1, all 10-digit calls for the Village of Ballston Spa and the sheriff's 10-digit calls. Neither Dutchess nor Saratoga exactly compare to Broome County because the operations are different.

Lackawanna County has a similar population, but a much higher population density. Also note that in Pennsylvania, the sheriff's office does not have the same law responsibility as in New York, so the operations are local police department specific in that regard.

Arlington County also has a similar population size, albeit an extremely high population density in comparison. Both Arlington County and Alexandria are also very small geographically, and like Pennsylvania, do not use the sheriff's departments in the same way for law enforcement. All of the PSAPs have a major metro area, although quite different in population and density from the Binghamton area of Broome.

2.2 Population and Density

	Housing Units	Households	Persons per Household	Multi-Structure
Broome County, NY	90,563	80,207	2.31	31.5%
Saratoga County, NY	98,656	84,165	2.52	22.9%
Monroe County, NY	320,593	286,327	2.45	30.8%
Lackawanna County, PA	96,832	86,924	2.30	30.4%
Dutchess County, NY	118,638	102,856	2.66	27.6%
Alexandria, VA	72,376	62,860	2.24	62.4%
Arlington County, VA	105,404	90,303	2.24	59.9%

Table 2-2: Population and Density

Broome County compares very favorably with Lackawanna County in the number of housing units, household, household density, and the percentage of multi-structure dwellings.

Saratoga County has less multi-structure buildings, as well as Dutchess County. Both have larger household density.

Monroe County compares very similar to Broome, noting that is has a far higher population.

Alexandra and Arlington both are urban areas with a large percentage of multi-structure units.

Although these numbers may not be directly relevant to operations, they provide a basis for the type of incidents and scale of operations. City operations are usually different than suburban or rural operations.

2.3 Median, Per Capita and Number of Firms

	Median Income	Per Capita Income	Number of Firms
Broome County, NY	$43,065	$24,432	14,023
Saratoga County, NY	$66,634	$31,554	18,851
Monroe County, NY	$50,283	$26,698	54,820
Lackawanna County, PA	$43,715	$23.774	15,566
Dutchess County, NY	$68,891	$30,637	26,074
Alexandria, VA	$80,186	$51,492	15,161
Arlington County, VA	$92,703	$55,514	19,422

Table 2-3: Median, Per Capita and Number of Firms

Broome County has the lowest median and per-capita income compared to any of the PSAPs visited with the exception of Lackawanna County, which has similar income levels. Note that the number of businesses in both Broome and Lackawanna counties are also low in comparison to the rest.

Monroe County has a slightly higher income level, with a large number of businesses.

Saratoga and Dutchess counties have almost one-third higher income with a larger number of businesses.

Alexandria also has a low number of businesses, as it is mostly an apartment community for the surrounding metro area, and a significantly smaller geographic area. Both Alexandria and Arlington have much higher income levels than the rest of the group, being urban in a high-cost-of-living area.

The income levels can be used as a basis for staff pay scales, and to a lesser extent, capital and operating budgets.

3 Responsibilities

3.1 Responsibilities

The following table lists the responsibilities of each PSAP.

Responsibilities	9-1-1	Seven-digit	After Hours
Broome County, NY	All Fire/EMS/Law	All Fire/EMS/Law County & BCC Security	County Health, DSS, DPW
Saratoga County, NY	Most Fire/EMS/Law	Sheriff	None
Monroe County, NY	All Fire/EMS/Law	All Law	None
Lackawanna County, PA	All Fire/EMS/Law	All Law	None
Dutchess County, NY	Most Fire/EMS/Law	None	None
Alexandria, VA	All Fire/EMS/Law	All Law	None
Arlington County, VA	All Fire/EMS/Law	All Law	None

Table 3-1: Responsibilities

Broome County has more diverse responsibility than most of the visited counties, being responsible for all public safety dispatch within the county as well as additional call taking responsibilities.

Saratoga and Dutchess counties have 9-1-1 call taking responsibilities. In Dutchess County, local police departments handle their own dispatch. Within Saratoga County, the city of Saratoga Springs has its own PSAP and does its own law dispatch. Fire and EMS dispatch is done be the county. Both counties are responsible for all EMS and most fire dispatch. Saratoga County's dispatch, being operated by the sheriff, does have 10-digit call taking responsibility for the sheriff and village of Ballston Spa.

Monroe County has most calls coming into 9-1-1 including animal patrol, and other non-emergency calls, but is responsible for all dispatch within the county.

Lackawanna County is a similar operation to Broome County, with the previously noted exception of the sheriff's department not having primary law responsibilities.

Alexandria and Arlington County have similar responsibilities to Broome County, with Alexandria similar in operation but having single law and fire departments. Arlington is also similar to Monroe in that it is very call center based, and is also looking at potentially taking responsibility for 3-1-1.

3.2 Interoperability Requirements

The following table shows some of the interoperability requirements on the dispatch side of their operations.

Interoperability	Task
Broome County, NY	None
Saratoga County, NY	None
Monroe County, NY	Ontario, 5 Counties in CAD
Lackawanna County, PA	None
Dutchess County, NY	None
Alexandria, VA	Arlington, Fairfax, Federal
Arlington County, VA	Alexandria, Fairfax, Federal

Table 3-2: Interoperability Requirements

Monroe County works closely with Ontario County, and besides sharing the new radio system, will also look to share CAD and 9-1-1. It was also noted that Monroe has all of the units for five local counties in its CAD system.

Alexandria and Arlington County are both highly dense metro areas. They have a unique shared CAD Interface that allows Alexandria, Arlington and Fairfax to dispatch units (fire/EMS only) from each of their CAD systems, even though they each have a unique CAD vendor. Both also have to work with a large presence of federal users in the area.

All of the agencies in the metro area can patch into each other's territory with the use of Raytheon ACU-1000 interoperability gateways that are located at strategic points in the area. It is the responsibility of the local jurisdiction to set up the patch per the request.

3.3 Overflow Agreements

The following table shows overflow agreements for 9-1-1 calls.

9-1-1 Overflow	Overflow To	Overflow From
Broome County, NY	NYSP (Sydney)	Tioga County
Saratoga County, NY	Warren County	N/A
Monroe County, NY	Ontario County	Ontario County
Lackawanna County, PA		N/A
Dutchess County, NY	Landline to City of Poughkeepsie, Wireless to Seven-Digit	City of Poughkeepsie
Alexandria, VA	None	None
Arlington County, VA	None	None

Table 3-3: Overflow Agreements

Broome County's 9-1-1 calls transfer to NYSP (Sydney) if not answered. They also receive overflow calls from Tioga County.

Saratoga County overflows to Warren County.

Monroe works closely with Ontario County and is looking to potentially share CAD and 9-1-1 systems with Ontario County. The two counties are currently building a shared radio system.

Dutchess landline calls transfer to Poughkeepsie, while the wireless calls transfer to seven-digit lines.

Neither Alexandria nor Arlington has overflow agreements, as none of the 9-1-1 points are capable of handling the overflow. As officials have remarked, with the proximity and density of their areas, any major incident is going to impact everyone.

4 Equipment

This section covers the equipment that each communications center uses.

4.1 Radio System Type

The following table shows the date that communications moved into its present facility, and the type of radio system currently being used.

	Dispatch Center	Radio System
Broome County, NY	1999	Analog Conventional
Saratoga County, NY	2007	P25 Trunked – 800, VHF Overlay
Monroe County, NY	2007	Analog Conventional – Moving to Harris P25 Trunked
Lackawanna County, PA	2007	Analog Conventional
Dutchess County, NY	1998	Analog Conventional
Alexandria, VA	2012	Trunked, Upgrading to P25 Trunked
Arlington County, VA	2008	Trunked, Upgrading to P25 Trunked

Table 4-1: Radio System Type

Note that everyone has a facility that is less than 5 years old with the exception of Broome and Dutchess counties, which moved into their centers at approximately the same time.

Only three of the systems are currently using trunking technology with the note that Monroe County is currently building out its P25 trunked system.

Saratoga has just moved onto a P25 trunked radio system and has a VHF overlay used for law enforcement and paging.

Being metro areas, Alexandria and Arlington County have operated on trunked radio systems for a long time.

Both Dutchess and Lackawanna will stay on their analog conventional systems.

In terms of pure comparison, this does not provide any indication that Broome should either stay conventional or go to trunked operation.

4.2 Communications Center Equipment

The following table shows what equipment is being used inside the communications centers.

	Furniture	Radio Consoles	9-1-1	CAD
Broome County, NY	Watson	Centracom II+	Sentinel Patriot	New World
Saratoga County, NY	Watson	MCC 7500	Sentinel Patriot	Impact
Monroe County, NY	Watson	Gold Elite	Sentinel	(PRC) to Tiburon
Lackawanna County, PA	Xybix	Zetron ACOM	Vesta	New World MSP
Dutchess County, NY	Watson	Gold Elite	Sentinel	New World MSP
Alexandria, VA	Bramic	MCC 7500	Sentinel Patriot	(SunGuard) to TBD
Arlington County, VA	Bramic	MCC 7500	Vesta	Tiburon

Table 4-2: Communications Center Equipment

With the exception of Lackawanna, which is using a Zetron ACOM console system, all others are using Motorola consoles.

Cassidian (Plant/CML) is the supplier of the 9-1-1 equipment for all of the PSAPs, although different platforms are being used.

CAD, as usual, is from multiple vendors, with New World Systems and Tiburon being the only common platform among the other players.

4.3 Main versus Backup Positions

The following table shows the number of positions available under the responsibility of the communications center. This is separated into the main communications center, dedicated training positions within the center, and a physically separate backup center. EOC positions are only counted if they are connected to the center's main communications equipment.

	Total Positions	Main	Backup	Training	EOC
Broome County, NY	28	17	11	None	None
Saratoga County, NY	12	8	4	None	None
Monroe County, NY	81	38	22	21	None
Lackawanna County, PA	20	13	?	6	1
Dutchess County, NY	21	13	5	3	None
Alexandria, VA	23+	20	?	3	None
Arlington County, VA	46	27	16	3	None

Table 4-3: Main versus Backup Positions

Note that Monroe County's training positions also serve as a full backup facility located within the main dispatch center.

Broome does not have dedicated training positions, but uses the backup center for training on CAD and phone.

Alexandria has not moved into its new facility. It is unknown what Alexandria will maintain for a backup system, as it will buy new equipment, not reuse the equipment in the present center.

Comparisons could be made to the number of positions versus the population of the county, number of incidents, etc. These ratios would not truly be relevant, as the number of different agencies, number of radio channels, and responsibilities for non-9-1-1 call traffic are all significant factors in determining number of positions, as well as staffing.

4.4 Types of Positions

The following table shows the breakout between call taker and dispatch positions at the main communications center.

Main Center	Total	CT Only	CT/Disp	Notes
Broome County, NY	17	4	13	
Saratoga County, NY	8	0	8	
Monroe County, NY	38	17	21	No 9-1-1 at Dispatch Pos
Lackawanna County, PA	13	3	10	
Dutchess County, NY	13	4	9	
Alexandria, VA	20	0	20	
Arlington County, VA	27	7	20	

Table 4-4: Types of Positions

With the exception of Saratoga and Broome County, all communications centers operate with separate call takers.

With the exception of Alexandria and Saratoga County, all centers have at least a few call taker positions that do not have radio access.

All the centers with the exception of Monroe County provide 9-1-1 phones at each dispatch position. Monroe County has phones at each position, but 9-1-1 only specifically is available at the call taking positions. Monroe County also has a much higher ratio of call taker only positions, but a later section will discuss that the county has a significantly higher number of calls than any of the other centers.

4.5 Types of Positions at Backup Center

The following table looks at the backup centers.

Backup Center	Total	CT Only	CT/Disp	Notes
Broome County, NY	11	10	1	Radio access by mobile
Saratoga County, NY	4	0	4	
Monroe County, NY	22	11	11	
Lackawanna County, PA	N/A	0	N/A	Unknown
Dutchess County, NY	5	5	0	Radio access by mobiles
Alexandria, VA	N/A	N/A	N/A	After move into new center
Arlington County, VA	16	0	16	Across street, want to move

Table 4-5: Types of Positions at Backup Center

All PSAPs have a physically separate backup site. Most of the systems have landline access to the radio system.

Broome County has a call taker backup center at the library, with radio access only provided by mobile. Note that there are several other locations in the county that have access to various channels of the radio system.

Dutchess is the only other county that has mobile radio only capability at the official backup center.

Saratoga, Monroe, Lackawanna and Arlington counties have full backup capability at alternate locations. Note that Arlington's backup is across the street, and it would like to move that to a more diverse location. Alexandria is in the process of moving into its new center, and will decide on backup capability afterward. Arlington's current dispatch center does provide for full-functioning backup.

4.6 Types of Training Positions

The following table shows dedicated positions for training in the main dispatch area.

Training Facility	Total	CT Only	CT/Dispatch	Notes
Broome County, NY	0	0	0	
Saratoga County, NY	0	0	0	
Monroe County, NY	21	10	11	
Lackawanna County, PA	6	4	2	
Dutchess County, NY	3	2	1	
Alexandria, VA	3	0	3	
Arlington County, VA	3	0	3	

Table 4-6: Types of Training Positions

With the exception of Broome and Saratoga counties, all communications centers have separate training areas located in the main dispatch center. Broome and Saratoga counties use their backup centers for training

4.7 9-1-1 Circuits

The following table shows the number of 9-1-1 circuits available to the PSAP and the percentage of wireless phone calls.

9-1-1	Total 9-1-1	Wire line	Wireless	VoIP	%Wireless
Broome County, NY	32	12	20	0	70%
Saratoga County, NY	10	6	4	0	63%
Monroe County, NY	192	Same	Same	0	70%
Lackawanna County, PA	15	8	7	0	64%
Dutchess County, NY	18	12	6	0	66%
Alexandria, VA	26	14	12	0	N/A
Arlington County, VA	48	16	16	16	72%

Table 4-7: 9-1-1 Circuits

Monroe County brings all its 9-1-1 lines in on T1s in a Centrex format, so its number of lines looks artificially high.

Arlington County has separate VoIP lines, but they are just a diverse path for calls to come in. VoIP and landline calls can come in on either line.

The number of lines needed is a function of the number of central offices, different providers and capacity needed. More rural areas tend to have more telephone companies servicing the area. More urban areas typically have more wireless providers.

Note that both Monroe and Arlington counties tend to be more call-center concentrated, generating more calls than emergency only.

Wireless usage is approximately the same for all the counties and Alexandria.

4.8 Telephone Line Comparison

The following table shows the total number of lines available to the communications center.

	Total All Lines	Admin/Seven-Digit	ACD?	Separate Call-Taker
Broome County, NY	67	35	Yes (by position)	No
Saratoga County, NY	18	8	No	No
Monroe County, NY	270	78	Yes	Yes
Lackawanna County, PA	31	16	Yes	Yes
Dutchess County, NY	28	10	Yes (by Login)	Yes
Alexandria, VA	51	25	N/A	Yes
Arlington County, VA	108	60	Yes (by Login)	Yes

Table 4-8: Telephone Line Comparison

Broome County would seem to be responsible in comparison for more lines than the other counties, with the exception of Monroe and Arlington counties, which as previously mentioned, are very call-center oriented.

Both Saratoga and Dutchess counties are 9-1-1 only dispatch centers, so do not have the responsibility for additional seven-digit call-in numbers for different agencies.

Broome County is the only communications center other than Saratoga County that does not have separate call takers. Saratoga County's operation does not necessarily merit the need for separate call takers, but as can be seen in later comparisons, Broome County handles many more calls than other counties.

Lackawanna County is the closest comparison in demographics and operation, but has less than half of the administrative and seven-digit lines that Broome County is responsible for.

4.9 Dispatch Tools Comparison

The following table shows some typical other tools used by dispatch.

	EMD	MDT	AVL	Pictometry
Broome County, NY	ProQA	Yes	Yes	Yes
Saratoga County, NY	ProQA	Yes	No	Yes
Monroe County, NY	ProQA	Yes	Yes	Yes
Lackawanna County, PA	APCO	No	Yes	Yes
Dutchess County, NY	ProQA	No	No	No
Alexandria, VA	Power Phone	Yes	Yes	Yes
Arlington County, VA	APCO	Yes	Yes	Yes

Table 4-9: Dispatch Tools Comparison

Most of the centers use ProQA for EMD, with a couple using APCO, while Alexandria uses PowerPhone.

Only Lackawanna and Dutchess counties don't have use MDTs. Note that Alexandria uses MDTs in lieu of most voice transmissions for standard dispatch operation.

Most centers use AVL with the exception of Saratoga and Dutchess counties.

All centers have Pictometry access with the exception of Dutchess.

4.10 Internet Access

	Internet Access
Broome County, NY	On CAD workstation at each position – managed access
Saratoga County, NY	N/A
Monroe County, NY	N/A
Lackawanna County, PA	N/A
Dutchess County, NY	Not available in dispatch, open access separate in training room
Alexandria, VA	Separate workstation; each position on own network
Arlington County, VA	1 station in each group, separate open access on side of the room

Table 4-10: Internet Access

The above table was included only to show the different ways that Internet access is available to the dispatchers. With the increasing need for Internet access and the growing amount of security needed in next-generation networks, it is interesting to see how different centers accommodate this access.

5 Agencies

The following shows the number of agencies within each jurisdiction and for law, the approximate number of units that are in use during typical shifts.

5.1 Units per Shift

	Fire Agencies	EMS Agencies	Local PD	County/State Units	Local Law Units
Broome County, NY	36	10	6	9-16	25
Saratoga County, NY	36	18	8	27	0
Monroe County, NY	46	32	16	N/A*	80
Lackawanna County, PA	30	17	28	0	50
Dutchess County, NY	36	5	17	0	60-70
Alexandria, VA	1*	5	1	4	35-120
Arlington County, VA	1*	1	1	14	0

Table 5-1: Units per Shift

* Total units only, included under local

Note that Alexandria and Arlington County each have one fire department that is comprised of 10 stations. Both Arlington County and Alexandria have one law agency to cover the area.

For all other counties, the number of fire agencies is approximately the same, so each county has the same number of different personnel to work with.

Compared with other counties, Broome is in the middle as far as the number of EMS agencies it works with. With the exception of Dutchess, and the fore mentioned Alexandra and Arlington, Broome has fewer agencies in the area as compared to other similar counties that were visited.

With the same exception for the Virginia PSAPs, Broome is also host to fewer local police departments. Lackawanna has a significantly higher number, but also does not have the equivalent duties for the sheriff's office that New York State has.

The number of law units available to the dispatchers is approximately the same for all. Like other statistics, the number of units is open to interpretation, as not all need to be dispatched by the communications center. We will look at more details later in this section in regard to the number of units and channels per dispatcher.

6 Staffing - General

This section provides some comparisons with the visited PSAPs for staff and details in loading for both call takers and dispatchers.

The following table is the overall staffing for each communications center.

6.1 Staffing

Staffing	Total Staff	Supervisor	FT Dispatch	Part Time
Broome County, NY	58	6	36	16
Saratoga County, NY	32	4	28	0
Monroe County, NY	192	18	174	0
Lackawanna County, PA	41	11	28	2
Dutchess County, NY	44	4	36	4
Alexandria, VA	55	4	51	0
Arlington County, VA	52	8	44	0

Table 6-1: Staffing

Alexandria uses temporary staff from its agencies, police, fire, and EMS. It is doing this until its staff is completely filled. Currently Alexandria is running nine per shift, but has funding for 12 per shift. An Alexandria study found that 16 per shift are needed.

Arlington County also has been using temporary staff until its positions are all filled. The county also has 17 administrative personnel, who are not included in the above table.

Lackawanna County has two part-timers, one of which primarily handles cleaning and maintenance. They do not expect to hire any more part-time dispatchers when the present dispatchers retire.

Monroe County has six additional staff members who are not part of dispatch, but handle IT, etc. Monroe County also operates a full-time radio shop.

Staffing Versus Population

The following table compares staff loading to the population.

Population versus Staff	Pop/Staff	Staff	Population
Broome County, NY	4012	50	200,600
Saratoga County, NY	6683	32	219,607
Monroe County, NY	3877	192	744,344
Lackawanna County, PA	5361	40	214,437
Dutchess County, NY	7083	42	297,488
Alexandria, VA	2545	55	139,966
Arlington County, VA	3993	52	207,627

Table 6-2: Staffing Versus Population

Notes:

For the purpose of the above table, Broome County was factored in as a staff of 50, counting the part timers at 50 percent. The same was done for Dutchess and Lackawanna counties.

Note that Saratoga and Dutchess Counties are 9-1-1 only, and do not have responsibilities for the local police departments once dispatched, nor do they have the responsibility for the seven-digit numbers for those departments.

Removing Saratoga and Dutchess County from the equation, Broome County has a lower staff per population ratio than anyone with the exception of Lackawanna County.

6.2 Calls per Staff

The following table shows the number of calls per staff.

Telephone Use Versus Staff	Calls/Staff	Staff	Calls
Broome County, NY	11338	50	566,875
Saratoga County, NY	9326	32	298,437
Monroe County, NY	9307	192	1,787,000
Lackawanna County, PA	10119	40	404,771
Dutchess County, NY	4682	42	196,638
Alexandria, VA	7727	55	424,966
Arlington County, VA	10200	52	530,411

Table 6-3: Calls per Staff

The above table is shown only for general comparison. Because all counties, with the exception of Saratoga County run separate call takers, specific comparisons will be made to determine the similar staffing levels using separate call takers for Broome County in comparison with other communications centers.

In general, Broome County handles more phone calls than any of the other PSAPs that were visited with the exception of Monroe, which has the highest population by far.

Arlington and Lackawanna counties closely compare to Broome as they run similar operations in that they handle most seven-digit and administrative phone lines.

6.3 Incidents per Staff

The following table shows the number of incidents per staff.

Incidents vs. Staff	Incidents/Staff	Staff	Incidents
Broome County, NY	3,697	50	181,846
Saratoga County, NY	2,434	32	77,874
Monroe County, NY	6,489	192	1,245,820
Lackawanna County, PA	5,173	40	206,930
Dutchess County, NY	2,814	42	118,180
Alexandria, VA	2,868	55	157,761
Arlington County, VA	2,664	52	138,529

Table 6-4: Incidents per Staff

This table shows Broome County at the median of the ranges. It is interesting to note that both Saratoga and Dutchess counties have lower incident counts as 9-1-1 only communications centers.

Compared with Lackawanna County, Broome handles slightly less incidents per staff member, but more than Arlington County, which has a similar-sized staff, but less incidents.

6.4 Staffing Types per Shift

Shift	Total	Call-Taker	Fire/EMS	County Law	Local Law	Supervisor
Broome County, NY	8-9	0	2-3	1	4	1
Saratoga County, NY	5-8	0	2-3	1-2	1-2	1
Monroe County, NY	28-33	8-13	6	11	<	3
Lackawanna County, PA	8-9	2-3	2	2	1	1-2
Dutchess County, NY	7-9	3	2-3	1-2	<	1
Alexandria, VA	8-10	5	1-2		1-2	2
Arlington County, VA	14	6	3	3		2

Table 6-5: Staffing Types per Shift

The above table shows the typical shifts that each communications center currently operates at. Since most dispatch centers have different staff levels depending upon time of day or shift, we used an average for comparison. In the next section, we will compare each PSAP in call takers, fire/EMS dispatchers and law dispatchers.

6.5 Staffing – Call Takers

The following table shows the number of calls handled by each communications center, separated by 9-1-1 and seven-digit.

6.6 9-1-1 Versus Seven-Digit Calls

	Total Calls	9-1-1 incoming	7-digit Admin incoming	7-digit / Admin Total	7 digit Outgoing
Broome County, NY	566,875	87,569	304,714	446,154	83,750
Saratoga County, NY	298,437	67,632	148,904	224,002	75,098
Monroe County, NY	1,787,000	1,100,000	481,000	687,000	N/A
Lackawanna County, PA	404,771	109,643	204,920	291,132	86,842
Dutchess County, NY	196,638	107,585	43,378	45,675	2,297
Alexandria, VA	424,966	90,012	N/A	334,954	N/A
Arlington County, VA	530,411	118,147	226,735	412,264	185,529

Table 6-6: 9-1-1 Versus Seven-Digit Calls

Broome County has more phone usage than any of the other PSAPs with the exception of Monroe County. Most of this usage is in administrative and seven-digit calls; the number of 9-1-1 calls is lower than all of the other PSAPs with the exception of Saratoga.

6.7 9-1-1 Versus Seven-Digit Calls as a Percentage

The following table shows the percentage of 9-1-1 calls as compared to the total number.

	9-1-1	7-digit / Admin Total
Broome County, NY	15%	85%
Saratoga County, NY	23%	77%
Monroe County, NY	62%	38%
Lackawanna County, PA	27%	73%
Dutchess County, NY	55%	45%
Alexandria, VA	21%	79%
Arlington County, VA	22%	78%

Table 6-7: 9-1-1 Versus Seven-Digit Calls as a Percentage

As can be seen, Broome County has a higher percentage of non-9-1-1 activity than any of the other PSAPs.

Dutchess County has the highest percentage of 9-1-1 calls with the exception of Monroe, but this is expected as a 9-1-1 only PSAP. Monroe County has a high percentage of 9-1-1 calls, but its operation is to call 9-1-1 for virtually every situation.

Surprisingly, Saratoga County has a 9-1-1 percentage that is close to the other full service communications centers. It is assumed that this relates to the county's responsibilities to the sheriff's office.

Alexandria and Arlington and Lackawanna counties are all within the same range.

6.8 9-1-1 Calls per Population

The following table looks at incoming 9-1-1 calls only and compares it to the population.

	9-1-1 Calls	Population	Calls per pop
Broome County, NY	87,569	200,600	0.44
Saratoga County, NY	67,632	219,607	0.31
Monroe County, NY	1,100,000	744,344	1.48
Lackawanna County, PA	109,643	214,437	0.51
Dutchess County, NY	107,585	297,488	0.36
Alexandria, VA	90,012	139,966	0.64
Arlington County, VA	118,147	207,627	0.57

Table 6-8: 9-1-1 Calls per Population

As can be seen, with the exception of Monroe for reasons explained before, most of the centers operate at less than one call for every two people. Alexandria is much higher, which would be expected as a city, along with Arlington County. Both are densely populated metro areas in comparison to the rest.

Saratoga and Dutchess counties have a lower call ratio. This would presume that the local police departments were responsible for taking some of the calls, which would be the case in Saratoga with Saratoga Springs operating its own PSAP.

6.9 Calls per Max-Min Staffing

The following table looks at the number of total incoming calls from all lines, and compares it to the number of specific call takers on a typical staff.

Call Takers per Total Calls	Calls/Staff-Min	Call/Staff- Max	Call Takers	Calls
Broome County, NY	98,071	78,457	4-5	392,283
Saratoga County, NY	N/A*	N/A*	N/A*	216,536
Monroe County, NY	131,750	121,615	12-13	1,581,000
Lackawanna County, PA	104,854	78,641	3-4	314,563
Dutchess County, NY	75,482	50,321	2-3	150,963
Alexandria, VA	106,242	84,933	4-5	424,966
Arlington County, VA	68,976	57,480	5-6	344,882
Average (without Monroe)	88,241	68,631	3.5-4.5	308,844

Table 6-9: Calls per Max-Min Staffing

*Saratoga does not have separate call takers

For comparison, we estimated four to five call takers for Broome County, with the assumption of separate call takers. This would put Broome close to the average of the other communications centers visited.

For the sake of comparison, we did not compare Monroe County, as its operation is considerably larger than the other counties.

At four to five call-takers, this puts the loading for Broome County a bit higher than the average of the other counties.

Another factor to look at is the number of lines that are concurrently in use. Data is not available from other PSAPS visited, but the following table shows that three lines are in use a good percentage of time, and the actual data shows usage up to seven lines at different points of each month. This would show a need for four call takers minimum to guarantee availability greater than 90 percent of the time.

6.10 9-1-1 Line Usage

1	2	3	4	5	6	7	8	9	10
60%	27%	10%	3%	1%	0%	0%	0%	0%	0%

Table 6-10: 9-1-1 Line Usage

Note that the data used was prior to the Broome County flooding. Taking a snapshot at the time of the flooding showed 10 lines in use on a consistent basis.

The other factors that we will examine are the incoming calls, both for 9-1-1 and for the seven-digit and admin lines. We will look at these statistics by time of day and by day of week to get a picture of the deviation from average that can be expected and use that data to manage the shift requirements.

6.11 9-1-1 Call Percentage by Day of Week

The following table and graph shows 9-1-1 calls by percentage of total by day of week.

SUN	MON	TUE	WED	THU	FRI	SAT
14.33%	13.59%	13.36%	13.51%	15.17%	14.99%	15.05%

Table 6-11: 9-1-1 Call Percentage by Day of Week

9-1-1 Call Percentage by Day of Week

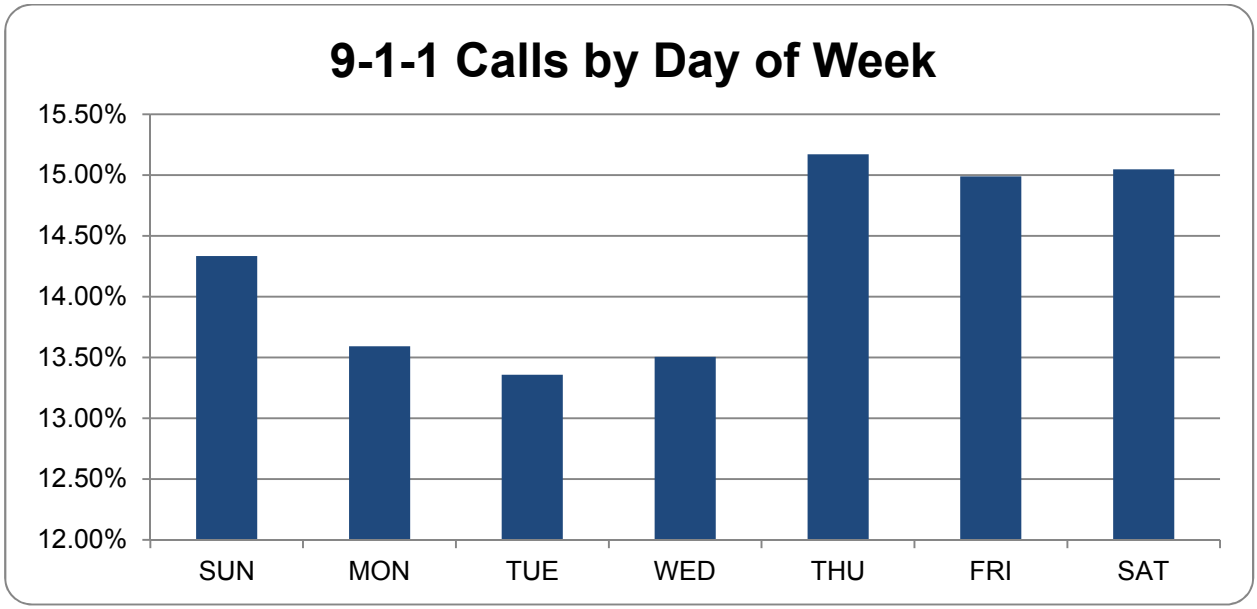

Figure 6-1: 9-1-1 Call Percentage by Day of Week

As can be seen, 9-1-1 calls are at their lightest Monday through Wednesday, with the heaviest loads on Thursday through Saturday, gradually tapering off through Sunday. This would generally point to the need for an extra call taker during the Thursday through Saturday night time frame.

The highest percentage is on Thursday, and represents a 6.2 percent increase of the average. The lowest percentage is on Tuesday and represents a decrease of 6.5 percent of the weekly average. The total deviation is 12.7 percent of the weekly average.

6.12 Call Percentage by Hour of the Day

The following table and graph shows 9-1-1 calls by percentage of total by hour of day.

TIME	PCT.
00:00:00	3.30%
01:00:00	2.97%
02:00:00	2.23%
03:00:00	2.11%
04:00:00	1.73%
05:00:00	1.38%
06:00:00	1.67%
07:00:00	2.56%
08:00:00	3.03%
09:00:00	3.64%
10:00:00	4.28%
11:00:00	4.59%
12:00:00	5.04%
13:00:00	5.35%
14:00:00	5.72%
15:00:00	6.34%
16:00:00	6.37%
17:00:00	5.98%
18:00:00	5.81%
19:00:00	5.58%
20:00:00	5.46%
21:00:00	6.40%
22:00:00	4.60%
23:00:00	3.85%

Table 6-12: 9-1-1 Call Percentage by Hour of the Day

9-1-1 Call Percentage by Hour of the Day

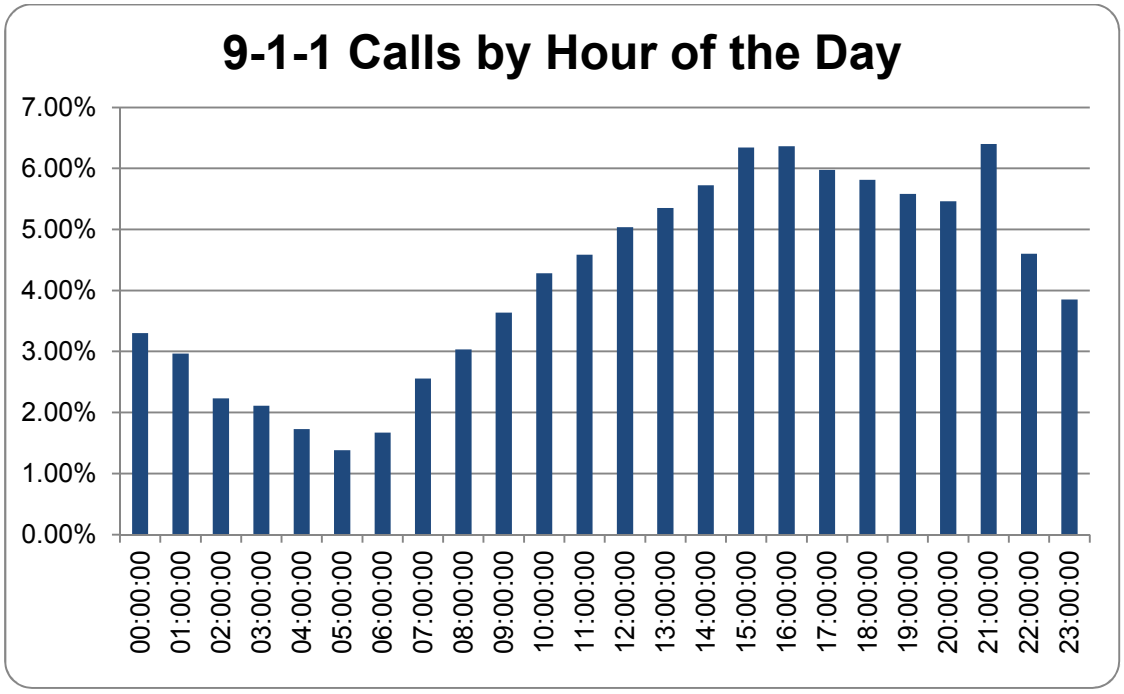

Figure 6-2: 9-1-1 Call Percentage by Hour of Day

The table shows a significant decrease in 9-1-1 call volume starting at around 10 p.m., and gradually decreasing to its lightest volume at 5 a.m., when it starts gradually increasing to its peak in later afternoons. There is almost a 3:1 delta between peak volumes and low early morning volumes. From a staffing point of view, this means that the number of call takers can start to decrease after midnight. Of course all dispatch centers usually reduce late night staffs due to call volume. Maximum call taker staffing should be available for the late afternoon, early evening time periods.

The highest percentage is around 2100, and represents a 53.6 percent increase of the average. The lowest percentage is around 0500, and represents a decrease of 66.9 percent of the daily average. The total deviation is 120.5 percent of the daily average.

6.13 Weekly Versus Hour of the Day Percentages

The following table shows 9-1-1 call volume in a combined table of time of day, and day of week. The highlighted values show call percentage equal to 50 percent more and 50 percent less than average.

	SUN	MON	TUE	WED	THU	FRI	SAT	TOTAL
00:00:00	0.62%	0.41%	0.37%	0.34%	0.45%	0.55%	0.56%	3.30%
01:00:00	0.51%	0.32%	0.29%	0.39%	0.37%	0.47%	0.61%	2.97%
02:00:00	0.42%	0.22%	0.25%	0.22%	0.25%	0.31%	0.56%	2.23%
03:00:00	0.51%	0.21%	0.17%	0.21%	0.20%	0.26%	0.55%	2.11%
04:00:00	0.36%	0.18%	0.17%	0.16%	0.22%	0.22%	0.41%	1.73%
05:00:00	0.25%	0.16%	0.15%	0.16%	0.19%	0.19%	0.28%	1.38%
06:00:00	0.25%	0.24%	0.20%	0.21%	0.29%	0.22%	0.27%	1.67%
07:00:00	0.31%	0.43%	0.31%	0.46%	0.45%	0.32%	0.29%	2.56%
08:00:00	0.33%	0.51%	0.48%	0.48%	0.42%	0.48%	0.33%	3.03%
09:00:00	0.50%	0.56%	0.48%	0.53%	0.49%	0.58%	0.50%	3.64%
10:00:00	0.66%	0.62%	0.59%	0.58%	0.62%	0.66%	0.55%	4.28%
11:00:00	0.62%	0.72%	0.62%	0.59%	0.66%	0.67%	0.70%	4.59%
12:00:00	0.66%	0.62%	0.70%	0.84%	0.70%	0.72%	0.80%	5.04%
13:00:00	0.78%	0.73%	0.78%	0.71%	0.77%	0.76%	0.83%	5.35%
14:00:00	0.75%	0.86%	0.79%	0.84%	0.82%	0.98%	0.67%	5.72%
15:00:00	0.94%	0.84%	0.89%	1.01%	0.95%	0.94%	0.78%	6.34%
16:00:00	0.90%	0.83%	0.95%	0.91%	0.94%	1.00%	0.84%	6.37%
17:00:00	0.79%	0.88%	0.85%	0.89%	0.84%	0.91%	0.82%	5.98%
18:00:00	0.83%	0.80%	0.80%	0.80%	0.90%	0.88%	0.80%	5.81%
19:00:00	0.81%	0.74%	0.77%	0.75%	0.79%	0.80%	0.91%	5.58%
20:00:00	0.69%	0.66%	0.85%	0.72%	0.86%	0.82%	0.86%	5.46%
21:00:00	0.72%	0.79%	0.83%	0.72%	1.68%	0.81%	0.84%	6.40%
22:00:00	0.61%	0.69%	0.62%	0.50%	0.76%	0.74%	0.68%	4.60%
23:00:00	0.51%	0.55%	0.46%	0.49%	0.56%	0.67%	0.60%	3.85%
Total	14.33%	13.59%	13.36%	13.51%	15.17%	14.99%	15.05%	100.00%

Table 6-13: Weekly Versus Hour of the Day Percentages

This data shows in detail what the last two graphs have shown. Low volumes are between 2 a.m. and 6 a.m., with a rise during the weekends. High volume is consistently late afternoon from 3-5 p.m., with some peaks on Thursday and Saturday nights.

As was shown earlier, 9-1-1 calls are less than 20 percent of the total call volume. This would equate to one call taker assigned to 9-1-1 only calls, with statistical comparisons only. In real operation, at least two call takers should be assigned to ensure that calls get answered in a timely manner. With a daily deviation of 120 percent, this would show the need for up to four 9-1-1 call takers at busy times.

6.14 9-1-1 Call Parameters

The following table shows an Erlang analysis for 9-1-1 calls.

The parameters were for a call time of 90 seconds, with 30 seconds allowed for wrap-up, with an average delay in answering of 10 seconds. This meets New York state guidelines. Broome County's phone records show average calls around 90 seconds.

Annual Calls	87,569
Daily	240
Average Hour	10
Busy Hour	24
Call-takers Required	
Average Hour	2
Busy Hour	3

Table 6-14: 9-1-1 Call Parameters

This follows very closely with the initial estimates. With the wide variance in activity, it would show a normal staffing level of one to two between midnight and 6 a.m., two to three from 6 a.m. to noon, and three to four between noon and midnight.

6.15 Seven-Digit Calls by Day of Week by Percentage

The following table and graph shows seven-digit and administrative calls by percentage of total by day of week.

SUN	MON	TUE	WED	THU	FRI	SAT
11.38%	15.29%	14.84%	14.89%	15.44%	15.50%	12.67%

Table 6-15: Seven Digit Calls by Day of the Week by Percentage

Seven-Digit Call Percentage by Day of Week by Percentage

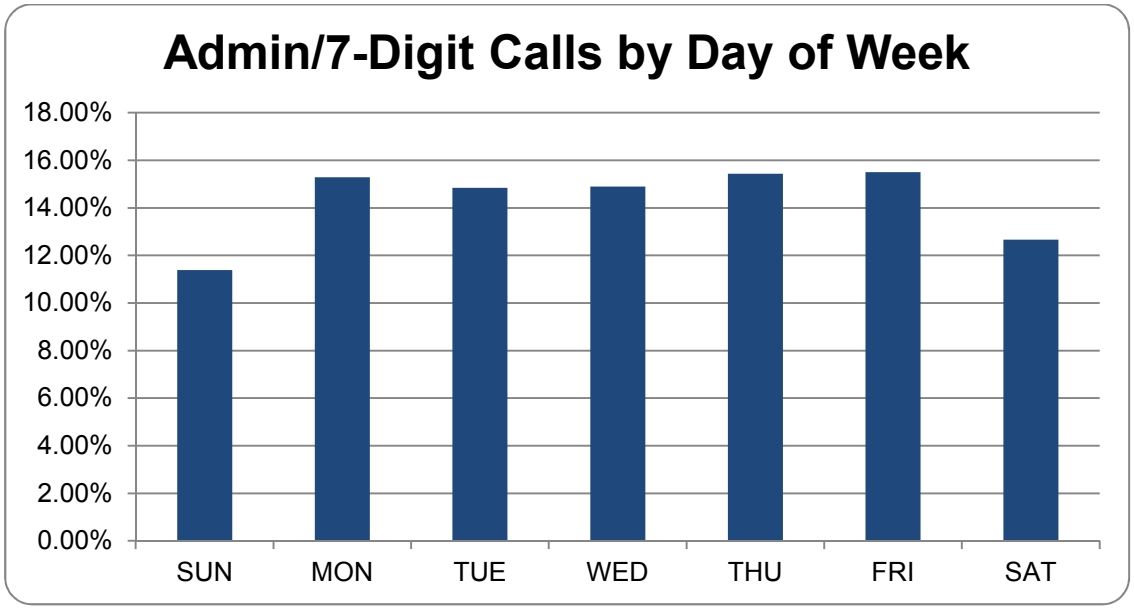

Figure 6-3: Seven-Digit Calls by Day of Week by Percentage

Since many of these calls are related to the actual agencies, and not the public, it can be readily seen that the highest levels consistently occur Monday through Friday.

The highest percentage is on Friday and represents an 8.5 percent increase of the weekly average. The lowest percentage is on Sunday and represents a decrease of 20.34 percent of the weekly average. The total deviation is 28.84 percent of the weekly average.

This could potentially allow for a smaller staff on weekends, but this needs to align with the total calls and responsibilities.

6.16 Seven-Digit Calls as Percentage by Hour

The following table and graph shows seven-digit and administrative calls by percentage of total by hour of day.

00:00:00	2.54%
01:00:00	2.03%
02:00:00	1.69%
03:00:00	1.62%
04:00:00	1.37%
05:00:00	1.39%
06:00:00	2.30%
07:00:00	2.93%
08:00:00	4.09%
09:00:00	5.01%
10:00:00	5.70%
11:00:00	5.76%
12:00:00	5.74%
13:00:00	5.88%
14:00:00	6.22%
15:00:00	6.71%
16:00:00	6.32%
17:00:00	5.52%
18:00:00	5.19%
19:00:00	4.72%
20:00:00	4.75%
21:00:00	4.78%
22:00:00	4.38%
23:00:00	3.36%

Table 6-16: Seven-Digit Calls as Percentage by Hour

Seven-Digit Calls as Percentage by Hour

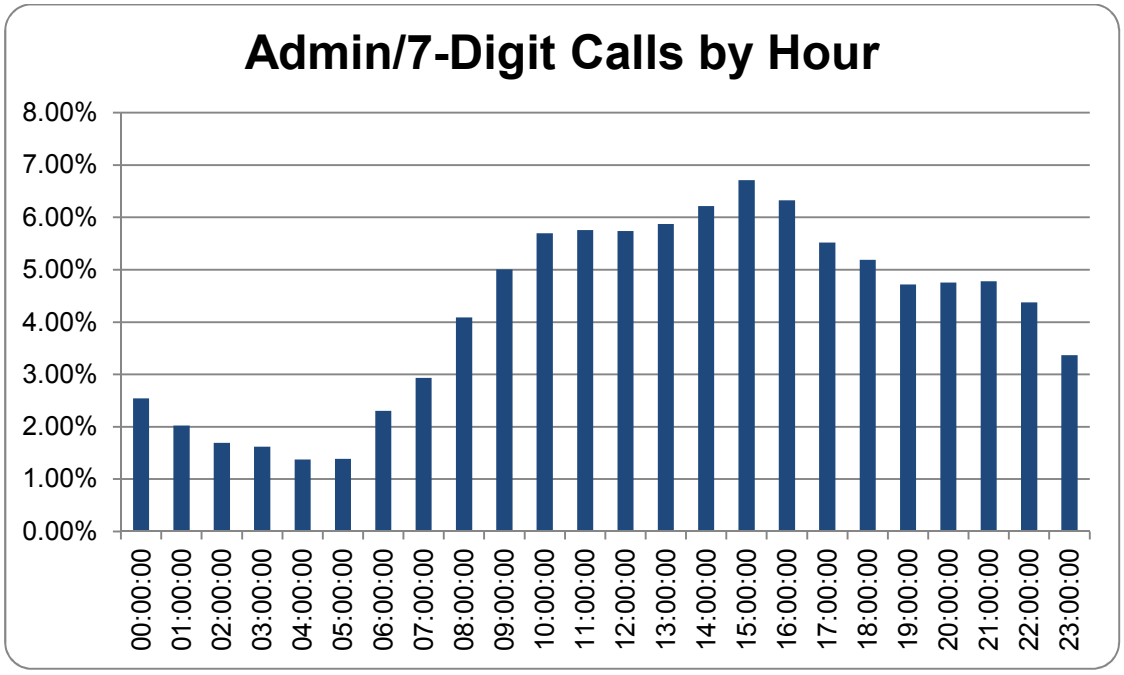

Figure 6-4: Seven-Digit Calls as Percentage by Hour

This shows consistently high usage during the daytime hours of 9 a.m. until 6 p.m., tapering off until midnight, with very low volumes from midnight through 7 a.m.

The low activity point of 0500 is at the same point as the 9-1-1 activity.

The highest percentage is around 1500, and represents a 61 percent increase of the average. The lowest percentage is around 0500, and represents a decrease of 67.1 percent of the daily average. The total deviation is 128.1 percent of the daily average.

6.17 Non-9-1-1 Calls by Percentage by Day and Time of Day

The following table shows non 9-1-1 call volume in a combined table of time of day, and day of week. The highlighted values show call percentage equal to 50 percent more and 50 percent less than average.

	SUN	MON	TUE	WED	THU	FRI	SAT	TOTAL
00:00:00	0.46%	0.30%	0.36%	0.30%	0.32%	0.38%	0.43%	2.54%
01:00:00	0.36%	0.26%	0.24%	0.27%	0.24%	0.32%	0.33%	2.03%
02:00:00	0.29%	0.18%	0.20%	0.23%	0.23%	0.25%	0.30%	1.69%
03:00:00	0.30%	0.18%	0.17%	0.18%	0.20%	0.25%	0.33%	1.62%
04:00:00	0.26%	0.17%	0.13%	0.13%	0.19%	0.19%	0.29%	1.37%
05:00:00	0.23%	0.21%	0.16%	0.17%	0.20%	0.19%	0.23%	1.39%
06:00:00	0.31%	0.37%	0.28%	0.30%	0.35%	0.37%	0.33%	2.30%
07:00:00	0.32%	0.47%	0.40%	0.43%	0.48%	0.45%	0.39%	2.93%
08:00:00	0.38%	0.70%	0.63%	0.61%	0.67%	0.62%	0.48%	4.09%
09:00:00	0.43%	0.85%	0.77%	0.78%	0.84%	0.83%	0.51%	5.01%
10:00:00	0.51%	1.00%	0.87%	0.87%	0.91%	0.93%	0.62%	5.70%
11:00:00	0.51%	0.95%	0.91%	0.94%	0.90%	0.93%	0.61%	5.76%
12:00:00	0.59%	0.88%	0.86%	0.90%	0.87%	0.93%	0.71%	5.74%
13:00:00	0.61%	0.88%	0.94%	0.93%	0.90%	0.96%	0.66%	5.88%
14:00:00	0.64%	1.01%	0.98%	0.96%	0.99%	1.01%	0.63%	6.22%
15:00:00	0.67%	1.10%	1.06%	1.10%	1.09%	1.03%	0.66%	6.71%
16:00:00	0.67%	0.98%	1.02%	0.96%	1.03%	0.96%	0.71%	6.32%
17:00:00	0.63%	0.84%	0.87%	0.90%	0.77%	0.84%	0.67%	5.52%
18:00:00	0.61%	0.79%	0.77%	0.82%	0.75%	0.77%	0.69%	5.19%
19:00:00	0.58%	0.63%	0.68%	0.72%	0.71%	0.74%	0.65%	4.72%
20:00:00	0.57%	0.70%	0.74%	0.71%	0.78%	0.62%	0.63%	4.75%
21:00:00	0.56%	0.68%	0.75%	0.67%	0.81%	0.68%	0.62%	4.78%
22:00:00	0.48%	0.67%	0.61%	0.61%	0.72%	0.66%	0.63%	4.38%
23:00:00	0.43%	0.49%	0.44%	0.40%	0.49%	0.56%	0.55%	3.36%
Total	11.38%	15.29%	14.84%	14.89%	15.44%	15.50%	12.67%	100.00%

Table 6-17: Non-9-1-1 Calls by Percentage by Day and Time of Day

This data shows in detail what the last two graphs have shown. Lowest volumes are between 1 a.m. and 6 a.m. High volume is consistently 10 a.m. to 4 p.m., and only on weekdays. Also note that there seems to be a slight drop off at noon, possibly department staff taking lunch breaks.

As was shown earlier, non-9-1-1 calls are more than 80 percent of the total call volume. This would equate to four call takers assigned to seven-digit and administrative calls, statistically only. With a daily deviation of 120 percent, this would show the need for up to eight call takers at the busiest times.

6.18 Parameters for Non-9-1-1 Calls

The following table shows an Erlang analysis of for non-9-1-1 calls.

The parameters were set for a call time of 60 seconds, with 30 seconds allowed for wrap-up, with an average delay in answering of 15 seconds. Broome County's phone records show average calls around 60 seconds. The admin lines also show that 11 percent of incoming calls were placed on hold, for an average of 40 seconds.

Annual Calls	388,464
Daily	1,064
Average Hour	44
Busy Hour	106
Call Takers Required	
Average Hour	3
Busy Hour	5

Table 6-18: Parameters for Non-9-1-1 Calls

This follows very closely with the initial estimates. With the wide variance in activity, it would show a normal staffing level of two to three between midnight and 6 a.m., three to four from 6 a.m. to 10 a.m., and five to six between 10 a.m. and midnight during the week.

Weekends show a significantly lower call volume. For weekends, two to three between midnight and 6 a.m., with three to four call takers between 6 a.m. and midnight would cover the activity.

6.19 Total Calls as Percentage by Day of Week

Next, we will examine the total call activity. The following table and graph show calls by percentage of total by day of week for all phone calls.

SUN	MON	TUE	WED	THURS	FRI	SAT
12.07%	14.89%	14.50%	14.57%	15.38%	15.38%	13.22%

Table 6-19: Total Calls as Percentage by Day of Week

Total Calls as Percentage by Day of Week

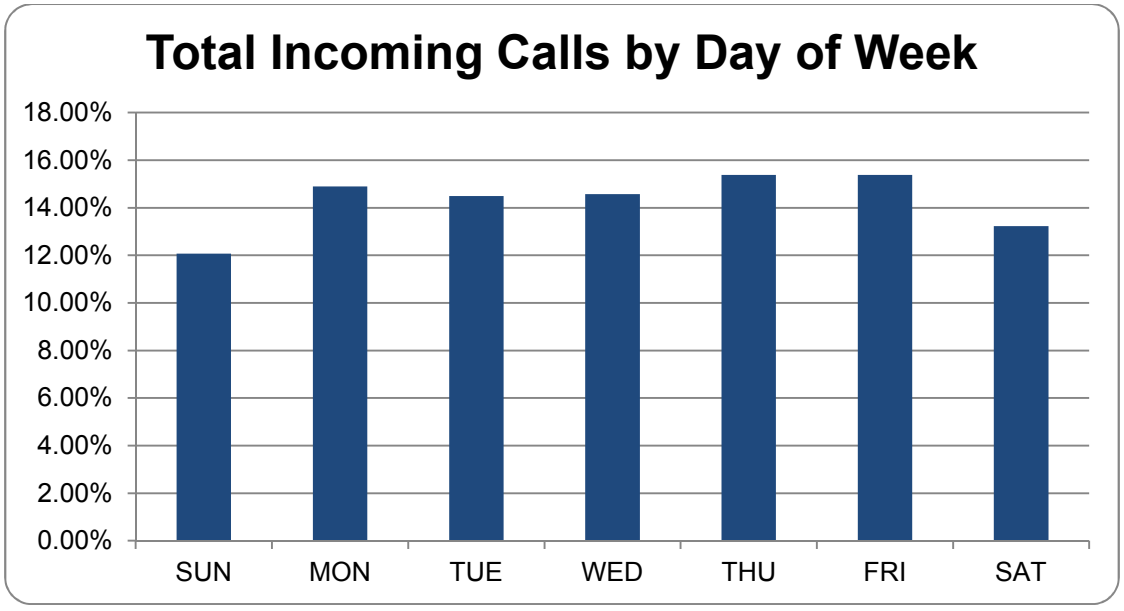

Figure 6-5: Total Calls as Percentage by Day of Week

It would seem that adding the total calls smoothes the per-day average a bit, as the increase in 9-1-1 calls Thursday and Friday add to the total load, while the decrease in administrative calls helps alleviate the 9-1-1 load for Saturdays. Sunday is still the slowest period overall.

The highest percentage is on Thursday and Friday and represents a 7.66 percent increase over the weekly average. The lowest percentage is on Sunday, and represents a decrease of 15.51 percent below the weekly average. The total deviation is 23.17 percent of the weekly average.

This could potentially allow for a smaller staff on weekends, but this needs to align with the total calls and responsibilities.

6.20 Incoming Calls by Percentage of Hour of Day

The following table and graph show the total incoming calls by percentage of total by hour of day.

00:00:00	2.72%
01:00:00	2.24%
02:00:00	1.82%
03:00:00	1.73%
04:00:00	1.46%
05:00:00	1.39%
06:00:00	2.16%
07:00:00	2.85%
08:00:00	3.84%
09:00:00	4.69%
10:00:00	5.37%
11:00:00	5.48%
12:00:00	5.58%
13:00:00	5.75%
14:00:00	6.10%
15:00:00	6.62%
16:00:00	6.33%
17:00:00	5.63%
18:00:00	5.33%
19:00:00	4.92%
20:00:00	4.92%
21:00:00	5.16%
22:00:00	4.43%
23:00:00	3.48%

Table 6-20: Table: Incoming Calls by Percentage of Hour of Day

Incoming Calls by Percentage of Hour of Day

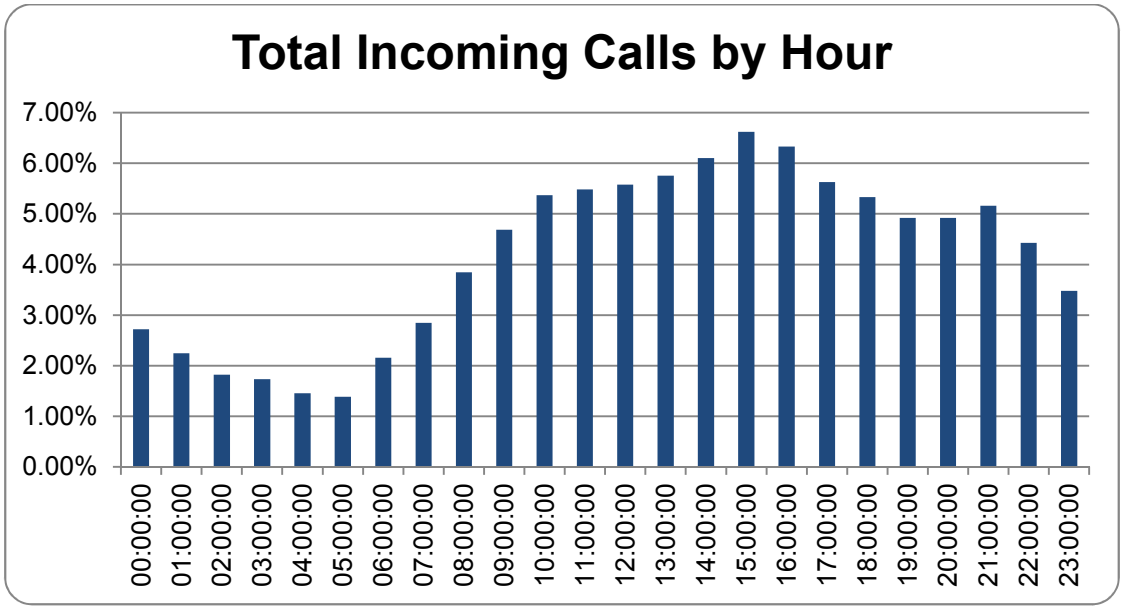

Table 6-21: Incoming Calls by Percentage of Hour of Day

This shows consistently high usage during the daytime hours of 9 a.m. to 6 p.m., tapering off until midnight, with very low volumes from midnight through 6 a.m. This shows the same curve as the 9-1-1 and administrative calls individually, but accentuates both the high volumes in the late afternoon and the low volumes after midnight.

The highest percentage is around 1500, and represents a 58.9 percent increase over the average. The lowest percentage is around 0500, and represents a decrease of 66.6 percent under the daily average. The total deviation is 125.5 percent of the daily average.

6.21 Incoming Calls by Percentage of Day of Week and Hour of Day

The highlighted values show call percentage equal to 50 percent more and 50 percent less than average.

	SUN	MON	TUE	WED	THU	FRI	SAT	TOTAL
00:00:00	0.50%	0.32%	0.36%	0.31%	0.35%	0.42%	0.46%	2.72%
01:00:00	0.40%	0.27%	0.25%	0.30%	0.27%	0.36%	0.40%	2.24%
02:00:00	0.32%	0.19%	0.21%	0.23%	0.24%	0.27%	0.36%	1.82%
03:00:00	0.35%	0.19%	0.17%	0.19%	0.20%	0.26%	0.38%	1.73%
04:00:00	0.29%	0.17%	0.14%	0.14%	0.20%	0.20%	0.32%	1.46%
05:00:00	0.23%	0.20%	0.16%	0.17%	0.20%	0.19%	0.24%	1.39%
06:00:00	0.30%	0.34%	0.26%	0.28%	0.33%	0.33%	0.31%	2.16%
07:00:00	0.32%	0.46%	0.38%	0.44%	0.47%	0.42%	0.37%	2.85%
08:00:00	0.37%	0.66%	0.60%	0.58%	0.61%	0.59%	0.44%	3.84%
09:00:00	0.45%	0.79%	0.70%	0.72%	0.76%	0.77%	0.51%	4.69%
10:00:00	0.54%	0.91%	0.80%	0.80%	0.84%	0.87%	0.60%	5.37%
11:00:00	0.53%	0.90%	0.84%	0.86%	0.85%	0.87%	0.64%	5.48%
12:00:00	0.61%	0.82%	0.82%	0.88%	0.83%	0.88%	0.73%	5.58%
13:00:00	0.65%	0.84%	0.90%	0.88%	0.87%	0.91%	0.70%	5.75%
14:00:00	0.67%	0.97%	0.94%	0.93%	0.95%	1.01%	0.64%	6.10%
15:00:00	0.73%	1.04%	1.02%	1.08%	1.06%	1.01%	0.69%	6.62%
16:00:00	0.72%	0.95%	1.00%	0.95%	1.00%	0.97%	0.74%	6.33%
17:00:00	0.67%	0.85%	0.86%	0.89%	0.79%	0.86%	0.71%	5.63%
18:00:00	0.66%	0.79%	0.77%	0.82%	0.79%	0.80%	0.71%	5.33%
19:00:00	0.63%	0.66%	0.70%	0.73%	0.73%	0.76%	0.71%	4.92%
20:00:00	0.60%	0.69%	0.77%	0.71%	0.80%	0.67%	0.68%	4.92%
21:00:00	0.60%	0.71%	0.77%	0.68%	1.02%	0.71%	0.67%	5.16%
22:00:00	0.51%	0.67%	0.62%	0.58%	0.73%	0.68%	0.65%	4.43%
23:00:00	0.45%	0.51%	0.45%	0.42%	0.51%	0.59%	0.56%	3.48%
Total	12.07%	14.89%	14.50%	14.57%	15.38%	15.38%	13.22%	100.00%

Table 6-22: Incoming Calls by Percentage of Day of Week and Hour of Day

This data shows in detail what the last two graphs have shown. Lowest volumes are between 1 a.m. to 6 am. High volume is consistently 2 p.m. to 5 p.m., and only on weekdays.

7 Staffing – Call Taker Summary

All of the numbers point to a flexible number of call takers. Monday through Friday, more call takers would be needed for the afternoon shifts during the week, tapering down to a lower staff at midnight, and then a limited staff until 6 a.m. All other shifts should maintain the average number of call takers.

The following table shows an Erlang analysis for total calls.

Treating all calls the same; the parameters were for a call time of 90 seconds, with 30 seconds allowed for wrap-up, with an average delay in answering of 10 seconds. This meets New York state guidelines. Broome County's phone records show average calls around 90 seconds and 60 seconds for seven-digit/admin. Note that the admin lines show that 11 percent of incoming calls were placed on hold, for an average of 40 seconds.

7.1 Staffing Based on Total Calls

Annual Calls	**476,033**
Daily	1,304
Average Hour	54
Busy Hour	130
Call Takers Required	
Average Hour	4
Busy Hour	8

Table 7-1: Staffing Based on Total Calls

This follows very closely with the initial estimates. With the wide variance in activity, it would show a normal staffing level of three to four call takers between midnight and 6 a.m., five to six call takers between 6 a.m. and noon, and seven to eight call takers between noon and midnight.

Weekends have a lower number of seven-digit calls, but an increased number of 9-1-1 calls. Overall, the call activity is lower, so five to seven call takers between 6 a.m. and midnight would be suitable for coverage.

8 Staffing – Dispatchers

This section will look at staff and loading on the dispatch side. The following table shows the number of incidents, broken out separately for agency where data is available.

8.1 Incidents per Service

	Total Incidents	Fire	EMS	County Law	Local Law
Broome County, NY	181,846	20,799	21,330	45,706	93,795
Saratoga County, NY	77,874	4,496	16,752	56,666	N/A*
Monroe County, NY	1,245,820	99,685	112,123	1,009,142	N/A*
Lackawanna County, PA	206,930	12,291	38,664	N/A*	155,683
Dutchess County, NY	118,180	23,636	47,128	N/A*	47,272
Alexandria, VA	79,554	18,120	10,945	N/A*	50,489
Arlington County, VA	138,529	34,376	(In Fire)	104,153	N/A*

Table 8-1: Incidents per Service

* Only numbers for total Law are available. Note that Alexandria does not have county law, and Arlington County operates only county law. Lackawanna County's sheriff does not have law enforcement responsibilities.

Note that Monroe County also had 24,916 incidents for animal control. They have a more liberal use of 9-1-1 than other PSAPs.

This following table shows what the general responsibilities of the PSAP are as it release to fire/EMS and law.

8.2 Percentage of Calls – Fire/EMS Versus Law

	Fire/EMS	Law
Broome County, NY	23%	77%
Saratoga County, NY	27%	73%
Monroe County, NY	17%	81%
Lackawanna County, PA	25%	75%
Dutchess County, NY	60%	40%
Alexandria, VA	37%	63%
Arlington County, VA	25%	75%

Table 8-2: Percentage of Calls – Fire/EMS Versus Law

It can be seen from this table that most of the incidents are law oriented with the exception of Dutchess County. Everyone else is at least 73 percent law, which includes Saratoga, a 9-1-1 only PSAP similar to Dutchess County.

8.3 Incidents Compared with Population

This table shows the ratio of incidents to population.

	Total Incidents	Population	Incidents per Pop
Broome County, NY	181,846	200,600	0.91
Saratoga County, NY	77,874	219,607	0.35
Monroe County, NY	1,245,820	744,344	1.67
Lackawanna County, PA	206,930	214,437	0.96
Dutchess County, NY	118,180	297,488	0.40
Alexandria, VA	79,554	139,966	0.57
Arlington County, VA	138,529	207,627	0.67

Table 8-3: Incidents Compared with Population

Again, both Saratoga and Dutchess are 9-1-1 only, and this accounts for their low incident creation because the local police departments have primary responsibility. Broome County's operations and demographics are most similar to Lackawanna, and their ratios are similar.

8.4 Dispatchers per Service

The table below shows the staff levels for a typical shift. The number of staff will be used to look at incident loading for agency types.

Shift	Total	Call-Taker	Fire/EMS	County Law	Local Law	Supervisor
Broome County, NY	8-9	0	3	1	4	1
Saratoga County, NY	5-8	0	2-3	1-2	1-2	1
Monroe County, NY	28-33	8-13	6	11	<	3
Lackawanna County, PA	8-9	2-3	2	2	1	1-2
Dutchess County, NY	7-9	3	2-3	1-2	<	1
Alexandria, VA	8-10	5	1-2		1-2	2
Arlington County, VA	14	6	3	3		2

Table 8-4: Dispatchers per Service

8.5 Personnel by Incidents

The table below looks at the number of general staff available for dispatch and compares it to the total number of incidents.

Personnel by Incidents	Incidents/Staff	Staff	Incidents
Broome County, NY	36,369	5	181,846
Saratoga County, NY	15,575	5	77,874
Monroe County, NY	73,284	17	1,245,820
Lackawanna County, PA	41,386	5	206,930
Dutchess County, NY	29,545	4	118,180
Alexandria, VA	26,518	3	79,554
Arlington County, VA	34,632	4	138,529

Table 8-5: Personnel by Incidents

Generally, the number of yearly incidents is 30,000 to 40,000 for each dispatcher during a typical shift, with the exception of Monroe (whose numbers are always higher than average). Saratoga is much lower as they do not use separate call-takers. As can be seen, Broome would fall within this range using a total of five to six dispatchers, assuming that call takers were separate.

8.6 Fire/EMS

Next we'll look specifically at fire/EMS dispatch and law dispatch. First we'll compare fire/EMS dispatch staff to the number of incidents.

Personnel by Fire/EMS Incidents

Personnel by Fire/EMS	Incidents/Staff	Staff	Incidents
Broome County, NY	21,065	2	42,129
Saratoga County, NY	10,624	2	21,248
Monroe County, NY	35,301	6	211,808
Lackawanna County, PA	25,478	2	50,955
Dutchess County, NY	23,588	3	70,764
Alexandria, VA	14,533	2	29,065
Arlington County, VA	11,458	3	34,376

Table 8-6: Personnel by Fire/EMS Incidents

Using a staff of two dispatchers would give Broome comparable numbers to the other similar operations.

8.7 Personnel by Law Enforcement Incidents

The following table repeats the same for law incidents.

Personnel by LAW	Incidents/Staff	Staff	Incidents
Broome County, NY	46,560	3	139,501
Saratoga County, NY	18,889	3	56,666
Monroe County, NY	91,740	11	1,009,142
Lackawanna County, PA	51,894	3	155,683
Dutchess County, NY	23,636	2	47,272
Alexandria, VA	25,245	2	50,489
Arlington County, VA	46,176	3	138,529

Table 8-7: Personnel by Law Enforcement Incidents

Using a staff of three dispatchers for Broome would give the county comparable numbers to the other similar operations.

These are only general numbers. There are many other factors such as background task, number of channels, number of units, etc., that also affect the efficiency of the dispatcher.

Similar to what we did for telephone, we'll look at incidents in more detail by day of week, hour of the day, and a combined table.

8.8 Percentage of Incidents by Day of Week

The following table and graph shows the percentage of total incidents per day of the week for Broome County.

SUN	MON	TUE	WED	THU	FRI	SAT
12.96%	13.69%	14.11%	14.78%	15.18%	15.28%	13.99%

Table 8-8: Percentage of Incidents by Day of Week

Percentage of Incidents by Day of Week

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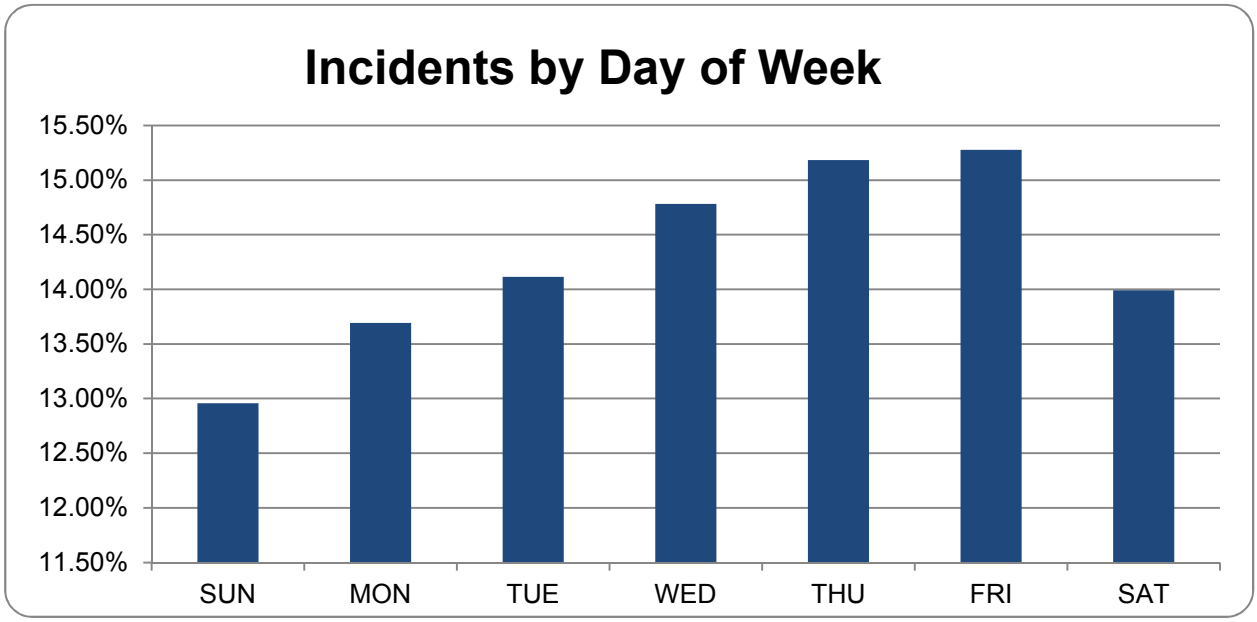

Figure 8-1: Percentage of Incidents by Day of Week

The data shows that Sunday has the least activity, and then the activity builds each day of the week before peaking on Friday, before dropping off again on Saturday.

8.9 Percentage of Total Incidents by Hour of Day

The following table and graph shows the percentage of total incidents per hour of the day for Broome County.

00:00:00	3.36%
01:00:00	2.91%
02:00:00	2.32%
03:00:00	2.10%
04:00:00	1.65%
05:00:00	1.50%
06:00:00	1.80%
07:00:00	3.11%
08:00:00	3.89%
09:00:00	4.36%
10:00:00	4.94%
11:00:00	4.94%
12:00:00	4.99%
13:00:00	5.36%
14:00:00	5.62%
15:00:00	5.99%
16:00:00	5.87%
17:00:00	5.59%
18:00:00	5.50%
19:00:00	5.38%
20:00:00	5.32%
21:00:00	5.31%
22:00:00	4.43%
23:00:00	3.76%

Table 8-9: Percentage of Total Incidents by Hour of Day

Percentage of Total Incidents by Hour of Day

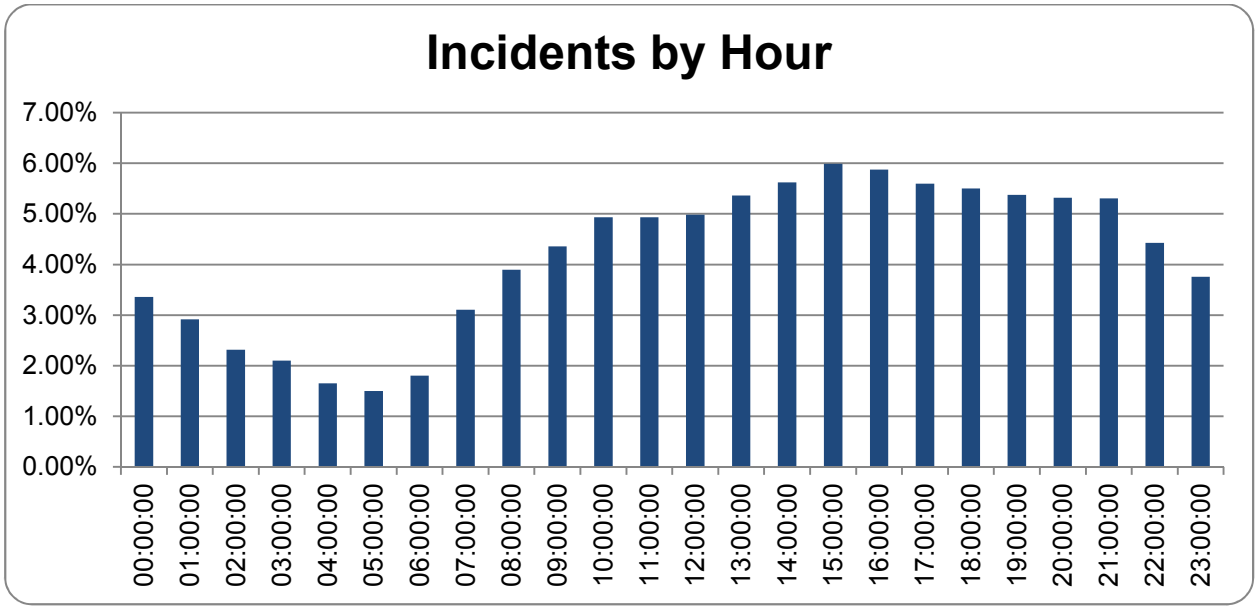

Figure 8-2: Percentage of Total Incidents by Hour of the Day

The data shows that the incident level peaks late afternoon, and then gradually drops off until it reaches its low activity point around 5 a.m. There is almost a 5:1 ratio between the highest point and the lowest point, and consistently high levels between 10 a.m. and 9 p.m.

8.10 Total Incidents by Time of Day and Day of Week Percentage

The highlighted values show incident percentage equal to 50 percent more and 50 percent less than average.

	SUN	MON	TUE	WED	THU	FRI	SAT	TOTAL
00:00:00	0.62%	0.42%	0.38%	0.37%	0.46%	0.52%	0.57%	3.36%
01:00:00	0.51%	0.32%	0.30%	0.38%	0.36%	0.47%	0.57%	2.91%
02:00:00	0.43%	0.22%	0.26%	0.25%	0.32%	0.32%	0.51%	2.32%
03:00:00	0.47%	0.20%	0.18%	0.22%	0.26%	0.24%	0.54%	2.10%
04:00:00	0.32%	0.21%	0.15%	0.16%	0.26%	0.22%	0.33%	1.65%
05:00:00	0.25%	0.18%	0.16%	0.18%	0.25%	0.23%	0.25%	1.50%
06:00:00	0.23%	0.30%	0.22%	0.24%	0.33%	0.22%	0.25%	1.80%
07:00:00	0.29%	0.49%	0.49%	0.51%	0.54%	0.47%	0.31%	3.11%
08:00:00	0.45%	0.60%	0.62%	0.63%	0.61%	0.63%	0.37%	3.89%
09:00:00	0.44%	0.72%	0.62%	0.70%	0.70%	0.66%	0.52%	4.36%
10:00:00	0.54%	0.73%	0.76%	0.76%	0.76%	0.80%	0.58%	4.94%
11:00:00	0.55%	0.72%	0.76%	0.76%	0.74%	0.75%	0.65%	4.94%
12:00:00	0.67%	0.69%	0.72%	0.79%	0.75%	0.71%	0.66%	4.99%
13:00:00	0.66%	0.67%	0.83%	0.91%	0.82%	0.85%	0.62%	5.36%
14:00:00	0.64%	0.86%	0.84%	0.91%	0.83%	0.89%	0.65%	5.62%
15:00:00	0.76%	0.87%	0.86%	0.99%	0.88%	0.93%	0.69%	5.99%
16:00:00	0.73%	0.81%	0.93%	0.89%	0.92%	0.87%	0.74%	5.87%
17:00:00	0.68%	0.78%	0.85%	0.92%	0.80%	0.87%	0.70%	5.59%
18:00:00	0.74%	0.79%	0.79%	0.81%	0.80%	0.80%	0.77%	5.50%
19:00:00	0.68%	0.68%	0.77%	0.84%	0.81%	0.82%	0.78%	5.38%
20:00:00	0.72%	0.65%	0.81%	0.75%	0.80%	0.80%	0.80%	5.32%
21:00:00	0.60%	0.69%	0.78%	0.74%	0.94%	0.78%	0.77%	5.31%
22:00:00	0.54%	0.60%	0.59%	0.58%	0.68%	0.74%	0.69%	4.43%
23:00:00	0.42%	0.49%	0.44%	0.49%	0.56%	0.70%	0.65%	3.76%
Total	12.96%	13.69%	14.11%	14.78%	15.18%	15.28%	13.99%	100.00%

Table 8-10: Total Incidents by Time of Day and Day of Week Percentage

As expected, the least active periods are between 2 a.m. and 6 a.m. Unlike the telephone activity, there are very few times that the incident activity runs 50 percent above average, but the numbers show high sustained levels for the entire period between 9 a.m. and 10 p.m. on weekdays, while weekends are slightly less during the same time period.

8.11 Percentage of Fire Department Activity

The following table and graph shows percentage of incidents for fire only. The three columns represent the percentage of total fire-only calls, percentage of fire/EMS calls and the percentage of total incidents.

Fire Company	INCS	% of FIRE	% of FIRE/EMS	% of ALL INCS
BINGHAMTON FIRE	8285	39.8%	19.6%	4.6%
ENDICOTT FIRE	2483	11.9%	5.9%	1.4%
JOHNSON CITY FIRE	2116	10.2%	5.0%	1.2%
VESTAL FIRE	798	3.8%	1.9%	0.4%
DEPOSIT FIRE	538	2.6%	1.3%	0.3%
CHENANGO BRIDGE FIRE	459	2.2%	1.1%	0.3%
ENDWELL FIRE	413	2.0%	1.0%	0.2%
WINDSOR FIRE	407	2.0%	1.0%	0.2%
UNION CENTER FIRE	405	1.9%	1.0%	0.2%
CONKLIN FIRE	397	1.9%	0.9%	0.2%
WEST CORNERS FIRE	394	1.9%	0.9%	0.2%
OTHER- FIRE	332	1.6%	0.8%	0.2%
WHITNEY POINT FIRE	315	1.5%	0.7%	0.2%
HARPURSVILLE FIRE	279	1.3%	0.7%	0.2%
CHENANGO FIRE	269	1.3%	0.6%	0.1%
LISLE FIRE	248	1.2%	0.6%	0.1%
FIVE MILE POINT FIRE	236	1.1%	0.6%	0.1%
PORT CRANE FIRE	224	1.1%	0.5%	0.1%
HILLCREST FIRE	210	1.0%	0.5%	0.1%
WEST WINDSOR FIRE	181	0.9%	0.4%	0.1%
PORT DICKINSON FIRE	176	0.8%	0.4%	0.1%
CHENANGO FORKS FIRE	162	0.8%	0.4%	0.1%
GELN AUBREY FIRE	152	0.7%	0.4%	0.1%
KIRKWODD FIRE	151	0.7%	0.4%	0.1%
CHOCONUT CENTER FIRE	147	0.7%	0.3%	0.1%
EAST MAINE FIRE	143	0.7%	0.3%	0.1%
TRIANGLE FIRE	140	0.7%	0.3%	0.1%
MAINE FIRE	134	0.6%	0.3%	0.1%
SANITARIA SPRINGS FIRE	120	0.6%	0.3%	0.1%
T/ BINGHAMTON FIRE	100	0.5%	0.2%	0.1%
PROSPECT TERRACE FIRE	77	0.4%	0.2%	0.0%
WEST COLESVILLE FIRE	73	0.4%	0.2%	0.0%
WEST ENDICOTT FIRE	62	0.3%	0.1%	0.0%
KILLAWOG FIRE	62	0.3%	0.1%	0.0%
NANTICOKE FIRE	47	0.2%	0.1%	0.0%
OUAQUAGA FIRE	46	0.2%	0.1%	0.0%
BING REG AIRPORT-CFR	18	0.1%	0.0%	0.0%
TOTAL			**49.1%**	**11.4%**

Table 8-11: Percentage of Fire Department Activity

Percentage of Fire Department Activity

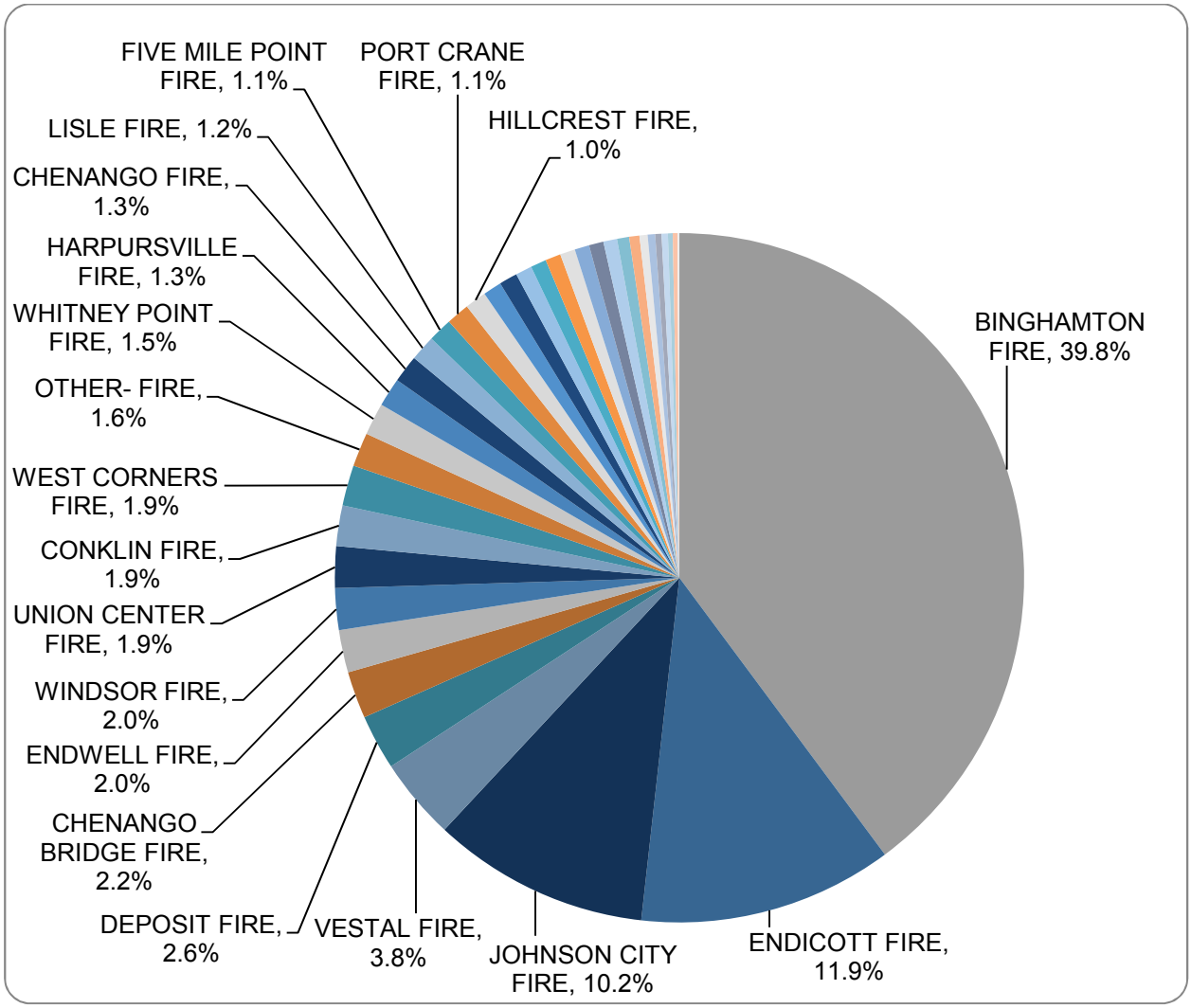

Figure 8-3: Percentage of Fire Department Activity

This chart shows that the city of Binghamton is responsible for almost 40 percent of the activity, with both Endicott and Johnson City being more than 10 percent.

It would be ideal to have all of fire onto one main channel, with a secondary dispatch channel available for simultaneous large incidents. If not, from a load perspective, combining Binghamton and Johnson City on one channel, and all others on a second channel would allow dispatch to easily operate with two dispatchers.

8.12 Percentage of EMS Agency Activity

The following table and graph shows percentage of incidents for EMS only.

Percentage of EMS Agency Activity

EMS Agency	INCS	% of EMS	% of FIRE/EMS	% of ALL INCS
UNION EMS	7735	36.3%	18.3%	4.3%
SUPERIOR EMS	5233	24.5%	12.4%	2.9%
BROOME AMBULANCE	4126	19.3%	9.7%	2.3%
VESTAL EMS	2438	11.4%	5.8%	1.3%
CHENANGO AMBULANCE	1054	4.9%	2.5%	0.6%
COLESVILLE AMBULANCE	438	2.1%	1.0%	0.2%
OTHER EMS	242	1.1%	0.6%	0.1%
HARPURS FERRY EMS	64	0.3%	0.2%	0.0%
TOTAL			**50.4%**	**11.7%**

Table 8-12: Percentage of EMS Agency Activity

Percentage of EMS Agency Activity

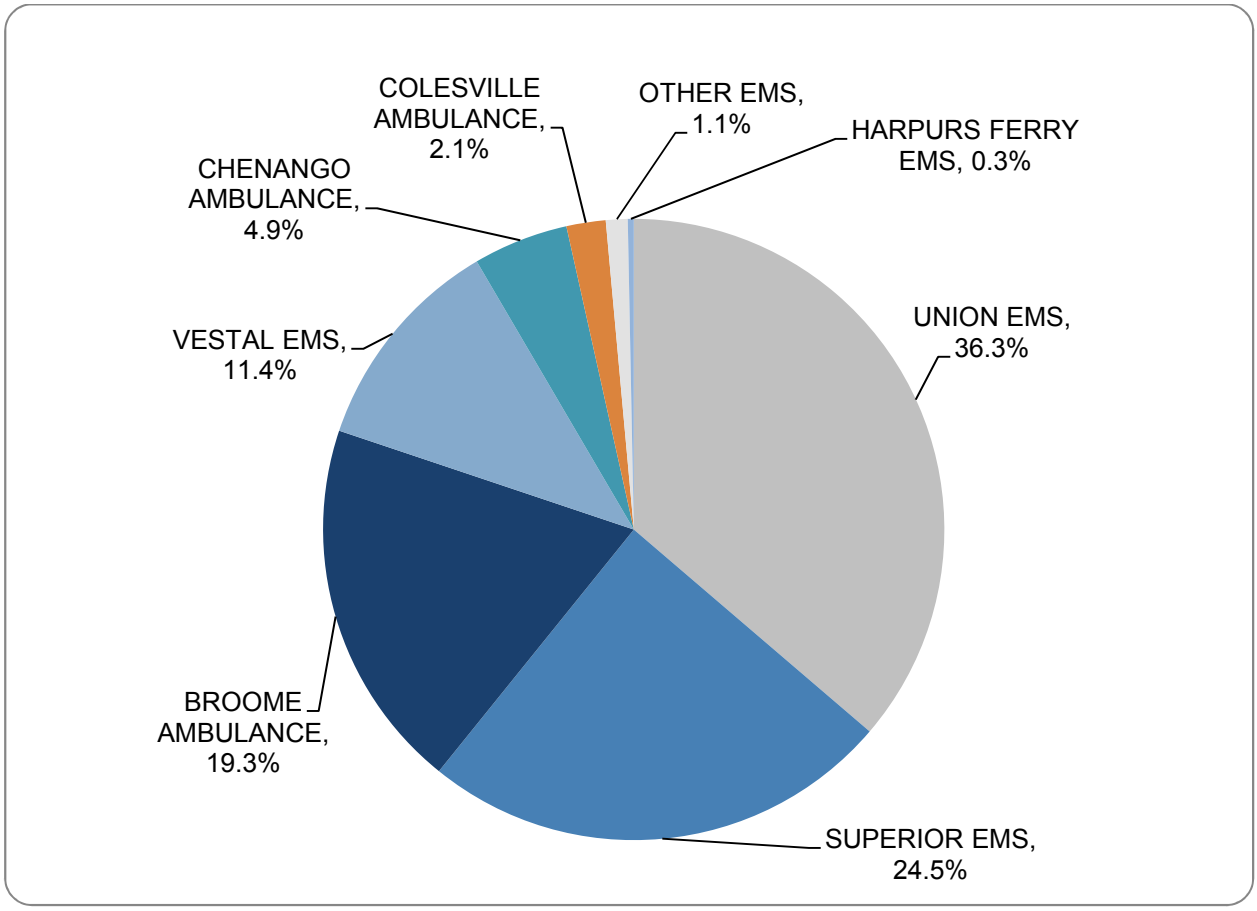

Figure 8-4: Percentage of EMS Agency Activity

Four agencies comprise the bulk of activity, and more than 90 percent of the total activity. Again assuming that all agencies can be combined onto one channel, EMS traffic should be able to be dispatched with the same Fire/EMS personnel.

8.13 Percentage of OES Activity

The following table is just for OES, coordinators, investigators, search and rescue, etc.

	INCS	%	% of FIRE/EMS	% of ALL INCS
BC OES-FIRE COORD	88	40.7%	0.2%	0.0%
BC OES-FIRE INVEST	81	37.5%	0.2%	0.0%
BC COMM (Comm Veh)	21	9.7%	0.0%	0.0%
BC OES-HAZMAT	15	6.9%	0.0%	0.0%
BC OES-SEARCH	6	2.8%	0.0%	0.0%
BC OES-DIVE RESC	5	2.3%	0.0%	0.0%
TOTALS			**0.5%**	**0.1%**

Table 8-13: Percentage of OES Activity

These activities comprise less than 0.5 percent of the fire/EMS activities, and less than 0.1 percent of all incidents. Statistically, this subset is an insignificant load to the dispatch operation.

8.14 Law Enforcement

The following table and graph shows percentages of incidents for law only.

Percentage of Law Enforcement Agency Activity

LAW Agency	INCS	% of LAW INCS	% of ALL INCS
BINGHAMTON POLICE	43973	31.5%	24.2%
BC SHERIFF	32067	23.0%	17.6%
VESTAL POLICE	17327	12.4%	9.5%
ENDICOTT POLICE	15556	11.2%	8.6%
JOHNSON CITY POLICE	14062	10.1%	7.7%
NYS POLICE	9169	6.6%	5.0%
BC GOV SECURITY	3995	2.9%	2.2%
PORT DICKINSON POLICE	1600	1.1%	0.9%
DEPOSIT POLICE	1277	0.9%	0.7%
BCC PUBLIC SAFETY	242	0.2%	0.1%
NYS PARK POLICE	209	0.1%	0.1%
NYS DEC OFFICERS	21	0.0%	0.0%
NYS FOREST RANGERS	3	0.0%	0.0%
TOTAL			**76.7%**

Table 8-14: Percentage of Law Enforcement Agency Activity

Percentage of Law Enforcement Agency Activity

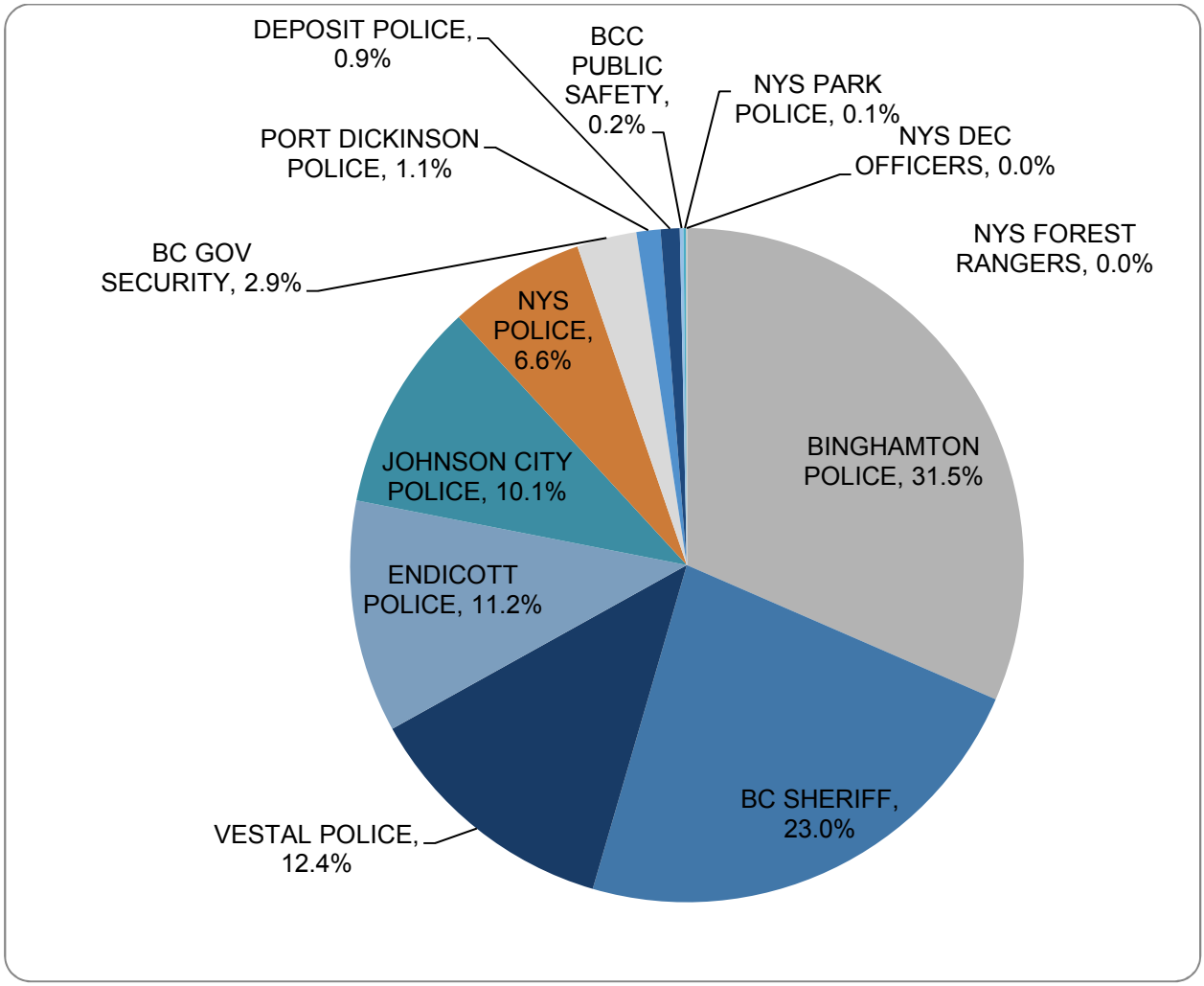

Figure 8-5: Percentage of Law Enforcement Agency Activity

Binghamton Police comprises almost one-third of all incidents. If you put the sheriff and NYSP together, this amounts to another one-third. The three major local police departments — Vestal, Endicott and Johnson City — comprise the final third. The other smaller departments, Broome Security, BCC Public Safety, and other New York state agencies, comprise about 5 percent of the total and are not statistically significant.

With a staff of three dispatchers, it would be ideal to have Binghamton on one dispatch channel, the sheriff and other state agencies on a second channel, and all of the local police departments on a third channel. This would provide for a balanced dispatch operation.

9 Staffing – Dispatcher Summary

Assuming radio channel consolidation and the use of separate call takers, Broome would require a minimum staff of five dispatchers on a typical shift. As a minimum, this would not change per hour of day or day of week.

During times of high activity, typically during the key hours between 8 a.m. and 10 p.m., there should be a "floater" that can either dispatch or take calls depending upon the situation.

9.1 Staffing – Summary

In comparing Broome County to the PSAPs visited and using some rule of thumb numbers, a typical shift staff of five call takers and five dispatchers is recommended, or a total shift of 10 not including the supervisor and possibly an assistant or acting supervisor.

The need for call takers will reduce after midnight until morning hours, so by 2 a.m., a total shift of seven to eight should handle routine call levels. The late morning to midnight shift during weekdays comprises the highest activity levels, which as shown before, primarily affects the call taker staffing which would add approximately two to three during that time until dropping off toward midnight.

If all of the communications staff is fully trained in call taking and dispatching on all positions, then staff levels can be leveled, as call takers and dispatchers can rotate to the highest demands as needed.

10 Staffing – Pay Scales

This section compares the general pay scales with both the median income of the area in comparison to other PSAPs visited.

10.1 Median Salary by County

	Median Income
Broome County, NY	$43,065
Saratoga County, NY	$66,634
Monroe County, NY	$50,283
Lackawanna County, PA	$43,715
Dutchess County, NY	$68,891
Alexandria, VA	$80,186
Arlington County, VA	$92,703

Table 10-1: Median Salary by County

10.2 Pay by County and Job Title

The following table shows starting pay levels for the various grades of call takers, dispatchers and supervisors.

Dispatch Level Pay Scale	Starting	Call-Taker	Dispatcher	Senior Dispatcher	Supervisor
Broome County, NY	$34k	None*	$34k	None*	$46k
Saratoga County, NY	N/A	None	N/A	None	None
Monroe County, NY	$42k	$42k	$48k	$51k	$67k
Lackawanna County, PA	$26k	None*	$26k-$31k	None*	$36.5k
Dutchess County, NY	$41k	None*	$41k-$46k	None*	$48k
Alexandria, VA	N/A	N/A	N/A	N/A	N/A
Arlington County, VA	$37k	$37k>	18 levels	18 levels	18 levels

Table 10-2: Pay by County and Job Title

*Do not have separate positions, **Saratoga

Note that both Arlington and Monroe have five separate dispatcher levels.

Saratoga only has dispatcher and sergeant.

10.3 Percentage of Median Income by County – Area

This table shows pay as a percentage of median income for the area.

Percentage of Median Income	Starting	Dispatcher	Supervisor
Broome County, NY	79%	79%	107%
Saratoga County, NY	N/A	N/A	N/A
Monroe County, NY	84%	95%	133%
Lackawanna County, PA	59%	65%	84%
Dutchess County, NY	60%	63%	70%
Alexandria, VA	N/A	N/A	N/A
Arlington County, VA	40%	45%	N/A

Table 10-3: Percentage of Median Income by County – Area

The table shows that comparatively, Broome County's staff is about average, neither high nor low. It is highly recommended that Broome evaluate adding additional positions and pay scales.