

**New York State
State Interoperable and Emergency
Communication Board**

**Interoperability Network IP
Addressing Plan**

**Best Practices and Recommendations for
Participating in the “System of Systems”**

**Produced by the “Public Safety Network
Interoperability Working Group” in conjunction
with the “Communications and Interoperability
Working Group” of the NYS SIEC Board**

Purpose:

The goal of this document is to provide all participants in the network for the New York State “System of Systems” for Interoperability, to have a standard IP addressing format for connections between sites, Counties, and Consortiums. This format in no way affects the addressing systems provided by local IT professionals and their internal systems. Its purpose is to assist in preventing IP conflicts, promote coordination, and to eliminate the need for each system vendor, consultant, or operator to develop a new plan for each installation.

Table of Contents

1.1 Overview 4

1.2 System Addressing 5

1.3 WAN Addressing 10

1.4 State / Province 12

1.5 Coordination 12

1.6 Future Needs 13

List of Tables

Table 1-1: System Addressing 5

Table 1-2: WAN Addressing 5

Table 1-3: System Addressing using FIPS code 6

Table 1-4: County Codes for Network Identification 7

Table 1-5: County FIPS codes for overflow 9

Table 1-6: WAN Addressing 10

Table 1-7: Inter-County WAN addressing 11

Table 1-8: Possible Consortium Addresses 12

Table 1-9: Provincial Addressing 12

Revision History

Revision #	Date	Description	Pages Affected
Original	09/13/13	Original Document	All

1.1 Overview

In multiple discussions between public safety users, vendors and consultants, virtually everyone is in agreement that we need a Statewide plan for the IP network addressing in the interoperability system. There have been multiple suggestions, and the following is the general consensus resulting from those discussions. There are many areas that need to be standardized for interoperability, but the most basic need at this time is to define a network addressing plan. As systems are rolled out, or interconnected via the OIEC grant funding stream, this coordination is paramount.

There are two main needs for a Statewide IP addressing scheme:

- Prevent address overlap, or conflicts
- Aid in identifying network activity

There are two main addresses that need to be coordinated:

- System Addressing: 192.168.XXX.XXX
- WAN Addressing: 10.XXX.XXX.XXX

Some Consortium systems are already active. Any interoperable plans need to be reviewed in terms of its effect on other existing systems in use, especially if these systems may be interconnected in the future. It was felt that there were only a couple of exceptions in existing systems, and there was no major existing conflict.

Primarily, the consensus uses the following general addressing schemes. For both *System* and *WAN* addressing, Octet 3 is used to designate a type of entity code, while Octet 4 is used for local numbering, usually sequentially within an entity.

<u>Octet 1</u>	<u>Octet 2</u>	<u>Octet 3</u>	<u>Octet 4</u>
192	168	County code	Locally assigned

Table 1-1: System Addressing

<u>Octet 1</u>	<u>Octet 2</u>	<u>Octet 3</u>	<u>Octet 4</u>
10	State code	County code	Locally assigned

Table 1-2: WAN Addressing

The *WAN* addressing has an additional Octet available; Octet 2. This has been identified as a potential use for state level codes. This is especially useful for those counties that have links across state boundaries or even country borders as in the case of Canada.

The primary octet of interest for addressing is the third octet in the system addressing and the third octet in the WAN addressing. All of the plans and suggestions have identified this octet to identify the county and other state or federal agencies. The primary difference has been what to use for identification.

1.2 System Addressing

After numerous conference calls and meetings, the consensus was to use the FIPS, (Federal Information Processing Standard), code identifier primarily due to the number of systems currently in production using this method. The FIPS code would reflect the County that the *site* was located in.

Octet 1	Octet 2	Octet 3	Octet 4
192	168	County FIPS code	Locally assigned

Table 1-3: System Addressing using FIPS code

The following table shows the County numbering that would be used.

<u>County</u>	<u>FIPS code</u>	<u>County</u>	<u>FIPS code</u>
Albany	001		
Allegany	003	Bronx	005
Broome	007	Cattaraugus	009
Cayuga	011	Chautauqua	013
Chemung	015	Chenango	017
Clinton	019	Columbia	021
Cortland	023	Delaware	025
Dutchess	027	Erie	029
Essex	031	Franklin	033
Fulton	035	Genesee	037
Greene	039	Hamilton	041
Herkimer	043	Jefferson	045
Kings	047	Lewis	049
Livingston	051	Madison	053
Monroe	055	Montgomery	057
Nassau	059	New York	061
Niagara	063	Oneida	065

Onondaga	067	Ontario	069
Orange	071	Orleans	073
Oswego	075	Otsego	077
Putnam	079	Queens	081
Rensselaer	083	Richmond	085
Rockland	087	St. Lawrence	089
Saratoga	091	Schenectady	093
Schoharie	095	Schuyler	097
Seneca	099	Steuben	101
Suffolk	103	Sullivan	105
Tioga	107	Tompkins	109
Ulster	111	Warren	113
Washington	115	Wayne	117
Westchester	119	Wyoming	121
Yates	123		

Table 1-4: County Codes for Network

1.2.1 State / Federal Addressing

Other agencies including State, Federal and other local agencies would use the same method. Since the FIPS code is determined by site location, not the owning agency, it would maintain the same format as a county.

1.2.2 Other Addressing

Using the FIPS code as the identifier allows up to 254 system devices to be addressed within a county. In the rare occurrence that a county would contain more devices, then the even numbers between FIPS codes may be used for overflow.

<u>County</u>	<u>FIPS code</u>	<u>County</u>	<u>FIPS code</u>
Albany	002	Allegany	004
Bronx	006	Broome	008
Cattaraugus	010	Cayuga	012
Chautauqua	014	Chemung	016
Chenango	018	Clinton	020
Columbia	022	Cortland	024
Delaware	026	Dutchess	028
Erie	030	Essex	032
Franklin	034	Fulton	036
Genesee	038	Greene	040
Hamilton	042	Herkimer	044
Jefferson	046	Kings	048
Lewis	050	Livingston	052
Madison	054	Monroe	056

Montgomer	058	Nassau	060
New York	062	Niagara	064
Oneida	066	Onondaga	068
Ontario	070	Orange	072
Orleans	074	Oswego	076
Otsego	078	Putnam	080
Queens	082	Rensselaer	084
Richmond	086	Rockland	088
St. Lawrence	090	Saratoga	092
Schenectady	094	Schoharie	096
Schuyler	098	Seneca	100
Steuben	102	Suffolk	104
Sullivan	106	Tioga	108
Tompkins	110	Ulster	112
Warren	114	Washington	116
Wayne	118	Westchester	120
Wyoming	122	Yates	124

Table 1-5: County FIPS

After allowing for overflow addressing, the use of FIPS codes only uses the first 124 out of 254 available addresses. Currently the upper addresses have not been defined for any use in system addressing and will be reserved for future use and exceptions, possibly for use by bordering states or provinces.

Note that even within a county, there may be multiple agencies/owners of sites that need their interoperable network addressing coordinated. It would be best to have one *Statewide coordinator*, or records keeper, for all Interoperable network IP addressing. In lieu of that, then each county/Consortium should have one coordinator for all interoperable network addressing within each county.

1.3 WAN Addressing

1.3.1 Intra-County

WAN addressing would use the same formula as system addressing using the FIPS codes of the site location. The FIPS codes as listed in the previous section would be the same for both primary and overflow.

Note that WAN addressing also allows for a state code in octet 2. Using the same formula, this octet would use the state FIPS code. For New York, the state code is 36.

Octet 1	Octet 2	Octet 3	Octet 4
10	State code (NY = 36)	County FIPS code	Locally assigned

Table 1-6: WAN addressing

Similar to the system addressing, Octet 4 *needs a central coordinator*, either by the State, or an address coordinator within the County/Consortium.

1.3.2 Inter-County

Since Inter-County links would not reside within a single county FIPS code, the consensus was to assign address 128 for inter-county links.

Octet 1	Octet 2	Octet 3	Octet 4
10 State code (NY = 36)	128	Locally assigned	-----

Table 1-7: Inter-County WAN addressing

Assigning a code of 128 would demand that this be coordinated at the state level. An alternative was suggested that we could possibly do this at the consortium level. Then the consortium would be responsible for administering inter-county addressing. A consortium code of 128 was assigned to the Adirondack Regional Interoperability Consortium as they are already using this. Other codes are only listed here *as examples*, (see below), and may be assigned as implemented.

Consortium	Code	Consortium	Code
Adirondack	128	Hudson Valley	129
Catskill	130	Central NY	131
Southern Tier	132	Southern Tier East	133
Finger Lakes	134	Northern NY	135
Western NY	136	Capital Region	137

Table 1-8: Possible Consortium Addresses

1.4 State / Province Addressing

As mentioned in the previous section, the second octet was assigned to state code. This would also allow this octet to be used to identify bordering Canadian provinces. Canadian province codes use the same range as the states. This may be accommodated by setting the first bit in the second octet to a "1" to identify this as an out of country code. As an example, Quebec would be "128+24" or an out of country code of 152.

<u>Province FIPS</u>	<u>Code</u>	<u>Province FIPS</u>	<u>Code</u>
Newfoundland	10 138	Prince Edward Island	11 139
Nova Scotia	12 140	New Brunswick	13 141
Quebec	24 152	Ontario	35 163
Manitoba	46 174	Saskatchewan	47 175
Alberta	48 176	British Columbia	59 187
Yukon	60 188	Northwest Territories	61 189

Table 1-9: Provincial Addressing

1.5 Coordination

This has been stated several times, but is worth repeating. Assignment of IP addresses for both system devices and WAN addressing needs to be coordinated, and tracked/recorded. Ideally, this would be best handled by a central State authority, (OIEC). Until such time as this is officially enacted, coordination within each Consortium, County, and between each County is imperative.

1.6 Future Needs

There are many other factors that need to be planned for, especially when using MPLS. Labels, Services, QoS, etc. all need to be examined individually as the plan/system evolves, and will be the subject of future discussion, and documentation.

The Working Group would like to thank all of those subject matter experts, and committee members, vendors, etc., that contributed to this important topic and its recommendations.