The Growth Of Telephone Area Codes In The U.S.


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As a Fax Server Architect (and Systems Administrator), one of my functions is to set up and maintain Least Cost Routing tables. If you have fax servers spread across several states (or countries), you want to route the fax jobs to minimize Toll Costs. This requires knowing about Telephone Area Codes and staying on top of new Area Codes being added. If there are also geographic areas that you want to block (i.e., Caribbean Islands), you also need to know which specific Area Codes are assigned to those areas. Most of the Caribbean Islands are included in the North American three-digit Area Code Numbering Plan, used in the United States and Canada. Long Distance routing is not quite as confusing of an issue as it used to be, when you had one telecommunications company providing your local service, but having to use a separate telecommunications company for long distance calling, particularly between LATA's (Local Area Transport Area) Boundaries. LATA's were established as part of the AT&T breakup, in 1984, defining which calls can be placed by your local telephone company (Baby Bells) and which ones required a Long Distance provider. Most telecommunication companies now support specific compliance rules allowing them to provide both Intra-LATA and Inter-LATA calls. There are close to 200 defined LATAs.   In some states, LATAs are separated by Area Code boundaries. A LATA boundary map is shown below:
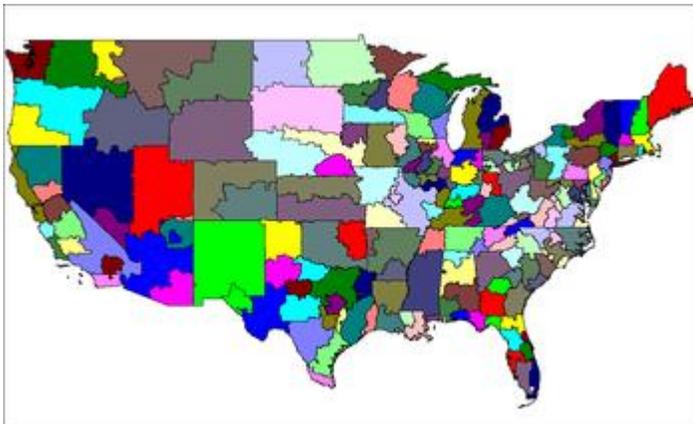
In addition to Tolls, Least Cost Routing tables are also set up to provide 'load balancing' of fax traffic between fax servers.

Prior to 1995, all Area Codes had to contain the digit '0' or '1' as the middle digit, to distinguish it from a Telephone Prefix (exchange). Prefixes are basically a 3-digit Telephone Central Office identification code, when paired with a particular Area Code. While the available capacity of new Area Codes worked for a number of years, by the early 1990's, the available pool of Area Codes was running critically low, and a solution had to be found. The available Prefixes within Area Codes were quickly being used up by an ever increasing demand for new phone numbers.

In addition to the 'standard' telephone line, people needed multiple phone lines for items such as; computer modems, fax machines, and cell phones. Also, new Independent telephone companies were popping up, with each requiring large blocks of dedicated phone numbers that they could assign to their own customers.

To make a couple more Area Codes available, Mexico was moved from the North American 3-digit numbering plan to the '011' International dialing. This only ended up helping a couple of areas in the U. S., having the most critical need for a new Area Code, to avoid running out of assignable numbers, with their current Area Codes.

To resolve the Area Code shortage, the FCC mandated a change that as of January 1st, 1995, there would no longer be the requirement that the second digit of an Area Code had to be a '0' or '1'. While this resulted in a large number of new assignable Area Codes, it also required that the telecommunication companies modify their Central Office Switching equipment to allow for this change. It became necessary that 10-digit dialing be used, even for local calls, to decipher between the Area Code and the phone Prefix. Some states/areas also started requiring that the digit '1' be included as the first character for all calls. In addition to Area Codes looking like phone Prefixes, Prefixes were also starting to look like Area Codes, allowing for '0' or '1' as the middle digit. This was only the start of the confusion.

Beginning in 1995, the assignment of new Area Codes was going in high gear, with 13 new Area Codes added, just that year. A challenge became on how to implement a new Area Code. In general, it could be added in one of two ways – SPLIT or OVERLAY.

SPLIT – The Geographic Area covered by the existing Area Code is cut into 2 parts. One part retains the existing Area Code and the second part is changed to the new Area Code. The problem is how do you decide which geographic area, gets to keep the old code and who has to switch? For businesses in the new Area Code boundary, this resulted in the added expenses to business customers of having to print new advertisement information (i.e., Signs, Business Cards, etc.). For some states such as NY, the new Area Code was assigned to Cell Phone users, while traditional phone users retain their current Area Code.

OVERLAY - The New Area Code cover the same Geographic Area as the existing Area Code. The benefit of the overlay is that all customers retain their existing phone number. The downside is that for customers wanting a new phone number in the original Area Code, no numbers may be available. For example, a business in Denver, CO may want a number with the '303' Area Code, as it is more identifiable as being from Denver than having a phone number with the '720' Area Code.

Each state's PUC (Public Utility Commission) would make the decision if a new Area Code should be a Split or Overlay. A period of time was allowed for public input, before making their final decision(s). For the new Area Codes added in the U. S. in over the last 20 years, there have been 95 Splits and 83 Overlays. California and parts of the Northeast have primarily been

where many of the Splits have taken place. In cities such as Long Beach, CA and Chelmsford, MA people have had 3 Area Codes within a 5 year window. This has been enough to drive people crazy, no matter a Fax Administrator or an end-user telephone customer!

Some states have even gone with a combination of a Split and Overlay. A good example of this is the state of Nevada. First, in 1998, the '702' Area Code was split, with Las Vegas keeping 702, and the rest of the state was changed to the '775' Area Code. Just this last year, Las Vegas got a second Area Code, '725', which is an Overlay.

From 1995 to present, 178 New Area Codes in the U. S. have been added. Of these, 95 were Splits and 83 Overlays. The following Text Box shows which states received the largest number of new Area Codes:

| U. S. STATES WITH THE MOST NEW AREA CODES	NUMBER OF NEW AREA CODES
CALIFORNIA	18
TEXAS	17
FLORIDA	13
NEW YORK	8
OHIO	8
ILLINOIS	7
MICHIGAN	7

While some other states added only a single new Area Code, if there was only one previous Area Code (i.e., New Mexico) this new second code still represents a 50% increase in telephone number capacity.

Since 1995, there has also been an exponential growth in the number of Toll-Free Area Codes. For a number of years, '800' was the only Toll-Free Area code. Traditionally, Prefixes within the 800 were assigned to a specific state. Prefixes were further broken down to be 'Interstate' or 'Intrastate' numbers. Interstate numbers were those used by callers from outside of the assigned state, while intrastate numbers could only be used by callers within the assigned state. For example, in Colorado, '525' was the Interstate Prefix and '332' was the Intrastate Prefix. Intrastate numbers typically had '2' as the third digit. If you tried calling a 332 number (from outside of Colorado), you would get a recording stating that "*The number have you dialed cannot be reached from your calling area*". Eliminating the state-specific assignments of these toll free numbers opened up some availability, but still not enough numbers for the demand. Over the last 20 years, the following new Toll Free Area Codes have been added: 844, 855, 866, 877, and 888. Notice this pattern! It is easy to assume that the next new Toll Free Area Code will be 833, followed by 822.

While there have been many new Area Codes added over the past 20 years, there are still some states (geographic areas)which still only need a single Area Code:

U. S. STATES/AREAS WITH ONLY 1 AREA CODE	AREA CODE
ALASKA	907
DISTRICT OF COLUMBIA	202
DELAWARE	302
HAWAII	808
IDAHO	208
MAINE	207
MONTANA	406
NEW HAMPSHIRE	603
NORTH DAKOTA	701
RHODE ISLAND	401
SOUTH DAKOTA	605
VERMONT	802
WYOMING	307

The following chart provides a view of the number of new U. S. Area Codes added over the last 20 years:
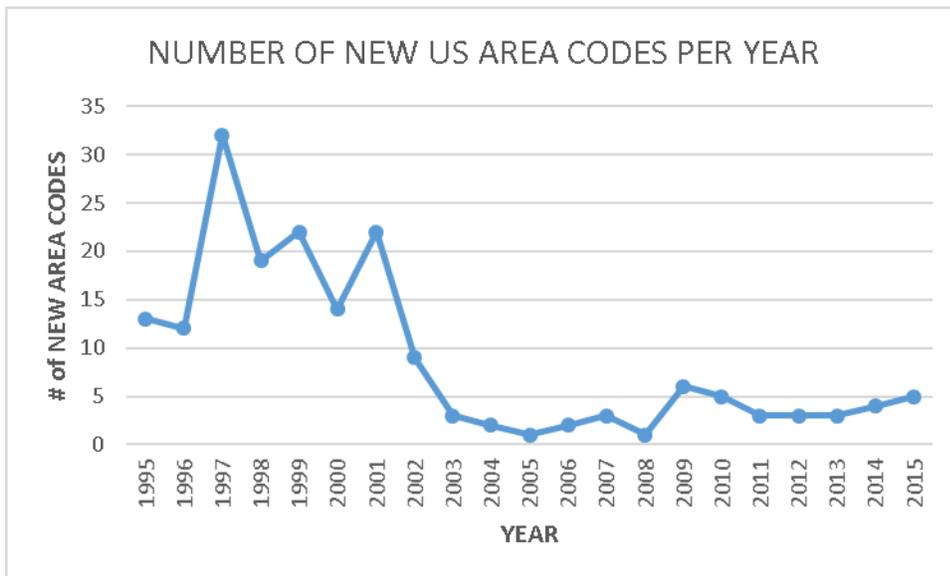
As per this chart, the crazy demand for new Area Codes finally began to settle down by 2003. Over the past 12 years, the number of new Area Codes added per year, are near the pre-1995 counts. A substantial number of new Area Codes are on reserve for particular states, however a handful of the planned service implementations have since been delayed or cancelled. There are several reasons which explain for this decreased demand:

- The use of dial-up modems has been greatly diminished and replaced with broadband.

- Some people are now getting rid of their 'landline' phones, just using cell phones.

- Many stand-alone fax machines have been retired. Where faxing is still required, they are being replaced by using Fax Servers.

- With the addition of the large number of Area Codes added, in the late 1990's, States/Regions now have an ample supply of available phone numbers, minimizing the need for additional Area Codes.

- Telephone companies reserved a handful of Prefixes for Central Office Testing. Freeing up most of these 'test' numbers, helped to decrease the need for new Area Codes.

- LPN (Local Number Portability) allows customers to keep their existing phone number(s) when switching to a different telecommunications provider. Before LPN, when customers switched providers (or moved to a different part of town), they had to change their phone number (Prefix), that was specifically assigned to that particular provider or location. This also required providers to reserve a larger number of available numbers.

- Also related to LPN, Prefixes can now be subdivided. For example, CenturyLink customers in the town of Georgetown, CO have the Area Code/Prefix 303,569. Until LNP, any number within the 569 Prefixes could only be assigned to their customers in and around Georgetown. Since this is a small town, most of numbers within this Prefixes would just sit unassigned, which is a waste of a full Prefix. With LNP, instead of just looking at the first three digits of the phone number (Prefix), subsets of this (and other Prefixes) can be assigned/sold to other telecommunication providers, and not necessarily to be used within Georgetown. For example, CenturyLink customers in Georgetown might have the following phone number ranges:

 (303)569-0xxx, (303)569-2xxx, (303)569-9xxx

  The remaining parts of the Prefix can then be assigned to other telecommunication companies, to be used in nearby areas that would be in the same local calling area as Georgetown.

  (303)569-1xxx, (303)569-3xxx, (303)569-4xxx, etc.

This results in putting more numbers into service that would otherwise sit in reserve, and most likely never be assigned. By being able to assign more numbers within a Prefix, cuts down the demand for more Prefixes, which in turn cuts down the need for additional Area Codes!

These other telecommunication companies are referred as "CLECs" (Competitive Local Exchange Carriers"), while the traditional "Bell" Companies are referred as "ILECs" (Incumbent Local Exchange Carriers"). Samples of CLECs are: Integra Telecom, XO Communications, and Level 3 Communications. Samples of ILECs are: CenturyLink, Verizon, and AT&T (Former 'Baby Bells', in providing local phone service). In June 2007, statistics showed that CLECs provided only 18% of end-user telephone lines.   By 2003, a third of all CLECs either merged or filed for bankruptcy. With the popularity of cell phone service, ILEC customer numbers have been dropping, in recent years, with people deciding to just have a cell phone, instead of a home wired-line phone.

With the growth of cell phone providers, it became even more important that the telephone companies be allowed to assign blocks of numbers based on the first 4 digits instead of the entire 3-digit prefix, to avoid quickly running out of numbers within the Area Codes. To graphically display the demand for new telephone numbers across the various telecommunication companies; I ran some Analytics, using Denver's 303 and 720 Area Codes. The following Charts show the assignment of ILEC number blocks (CenturyLink) versus the CLECs which serve the Denver area:

CURRENT ASSIGNMENT OF
PHONE NUMBER BLOCKS
BASED ON 1ST 4 DIGITS FOR
303 & 720

CenturyLink

CLECs
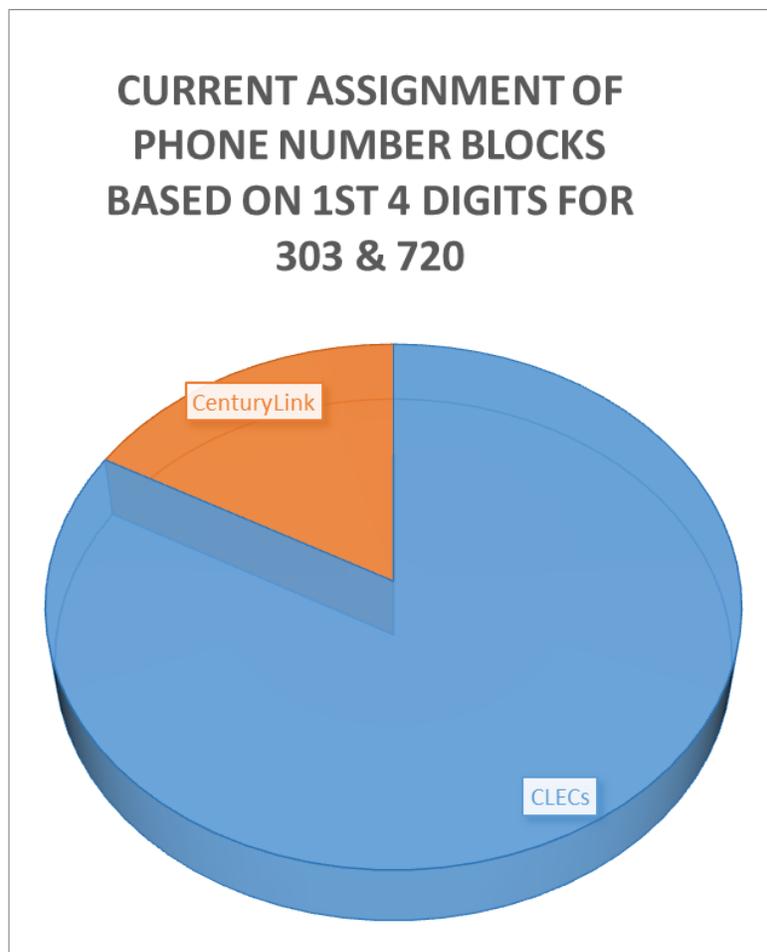
Current as of 3/19/2016

Company	# of assigned 4 digit Blocks
CENTURYLINK (QWEST) CORPORATION	1663
CELLCO PARTNERSHIP DBA VERIZON WIRELESS - CO	1302
NEW CINGULAR WIRELESS PCS, LLC	1297
SPRINT SPECTRUM L.P.	815
T-MOBILE USA, INC.	570
BANDWIDTH.COM CLEC, LLC - CO	418
XO COLORADO, LLC	410
USA MOBILITY WIRELESS, INC.	351
LEVEL 3 COMMUNICATIONS, LLC - CO	348
TELEPORT COMMUNICATIONS AMERICA, LLC - CO	345
COMCAST PHONE OF COLORADO, LLC - CO	293
ICG TELECOM GROUP - CO	270
AT&T LOCAL	209
MCIMETRO ACCESS TRANSMISSION SERVICES LLC	206
CBEYOND COMMUNICATIONS, LLC - CO	183
ESCHELON TELECOM OF COLORADO, INC. - CO	118
ONVOY, LLC - CO	105
GLOBAL CROSSING LOCAL SERVICES, INC.-CO	99
MCLEODUSA TELECOMMUNICATIONS SERVICES, INC.- CO	95
AMERICAN MESSAGING SERVICES, LLC	90
METRO PCS, INC.	86
BROADVOX-CLEC, LLC - CO	84
TW TELECOM OF COLORADO LLC - CO	83
NEUTRAL TANDEM-COLORADO, LLC - CO	60
PEERLESS NETWORK OF COLORADO, LLC - CO	45
YMAX COMMUNICATIONS CORP. - CO	44
CONTACT PAGING OF COLORADO, INC.	40
PAC - WEST TELECOMM, INC. - CO	38
4DIVISION, LLC - CO	21
COMMUNICATIONS UNLIMITED	20
STRASBURG TELEPHONE CO.	20
ILOKA, INC. DBA NEWCLOUD NETWORKS - CO	19
CONVERGENT COMMUNICATIONS, INC. - CO	11
NEXTWAVE TELECOM, INC DBA NEXTWAVE WIRELESS	11
BIJOU TELEPHONE COOPERATIVE ASSOCIATION, INC.	10
ROGGEN TELEPHONE COOPERATIVE CO.	10
EASTERN SLOPE RURAL TELEPHONE ASSOCIATION, INC.	10
GREAT WEST SERVICES, LTD. - CO	10
HYPERCUBE TELECOM, LLC - CO	10
TELSTAR COMMUNICATIONS INC	10
INTERLINK ADV SVC DBA FORETHOUGHT.NET - CO	6
N.E. COLORADO CELLULAR, INC.	6
COMMNET WIRELESS, LLC	3
LIVE WIRE NETWORKS, INC. - CO	2
365 WIRELESS, LLC	1
ALLEGIANCE TELECOM OF COLORADO, INC.	1
BIG RIVER TELEPHONE COMPANY, LLC - CO	1
ELBERT COUNTY WIRELESS, LLC	1
FASTTRACK COMMUNICATIONS, INC. - CO	1
RCLEC, INC. - CO	1
TELIAX, INC. - CO	1
ZIPPYTECH INCORPORATED	1
Total Assigned Blocks	**9854**
Each block contains 999 available phone numbers	

With the introduction of 'Number Portability', number assignments have gotten even a little more confusing! While you might have originally been assigned a specific phone number, based on the telecommunications company and your location, if you switch phone provider or move to a different part of town, you can still keep your phone number! So no longer can you determine which part of town a particular prefix is in, or which telecommunications company it is assigned to. The good part is that you don't have to learn a new number!

An interesting approach that some businesses are now doing is that in addition to their 'main' phone number, they are also adding additional numbers for purposes of marketing. This way, if they advertise their businesses by various means (i.e., newspapers, TV, Radio, Web), they can specify a different number for each way of marketing. Then, they can go back and track how many calls came in from each number, to determine how well the various marketing avenues are working. This is typically done by getting numbers from CLECs, which then age forwarded to the business's main number. The down side is that this eats up more phone numbers.

Phone number shortages are not just an issue within the United States. Different countries have had their own ways on how to best deal with this type of issue. In some countries, Area (City) Codes have stayed consistent, but phone numbers have been increased to 8-digits long. Other countries only added an extra digit only to phone numbers in their larger cities, eliminating a consistency in the number of digits, making things much more confusing. Since the United States still has an ample supply of available Area Codes, there is no need to consider going to an 8-digit phone number, in the foreseeable future.

As a couple of final notes:

- Within Telecommunications terminology, an Area Code is also referred to as an 'NPA' and Prefix (Exchange) is also referred to as a 'NXX'.

- Most current Fax Server environments now support FAPI (Fax over IP), removes much of the concerns around transmission toll costs and Least Cost Routing.

References:

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How ILECs Work (http://electronics.howstuffworks.com/ilec3.htm)

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