Docket #95-61

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Office of the Secretary
Federal Communications Commission
Washington D.C. 20544

Re: Notice of Inquiry - NLC Commentary for 1995 Competition Report

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To whom it may concern;

The following comments are offered for the FCC's Notice of Inquiry related to the gathering of information for the 1995 Competition Report. While most of the suggested topics of discussion are specifically related to Multichannel Video Programming Distributors (MVPD) , and the competitive issues confronting existing MSOs, there are various areas of interest / expertise that Next Level Communications (NLC) would like to address related to the evolving technologies most likely utilized by and issues facing the Local Exchange Carriers (LECs) in a competitive Video Dial Tone (VDT) offering.

It is important to understand the rational for LEC entry in the video market. Most of the recent publicity has been given to LEC Broadband deployment efforts centered around the need to compete with an existing MSO within the Regional confines of the LEC. The FCC's 1992 Video Dial Tone Order defined the guidelines by which an LEC can compete in the arena of video delivery and by which, deployment plans as a non-discriminatory,

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common carrier provider can be implemented. The Section 214 process established waivers for a LEC to carry video services within its Region for the purposes of trialing various technologies or test marketing new services, and for the widescale deployment of VDT compliant Broadband Systems. However, the LEC have found the 214 process is very cumbersome, time consuming, and severely limiting should technological advancements occur during the period of time in which a LEC filing is in the FCC queue.

While video entry is the current frenzy, it our belief that the primary drivers for broadband rebuild efforts are only due, in part, to video service opportunities.

These primary drivers can be generally categorized into three key areas:

1) The LECs are primarily driven by the need to protect their embedded base of customers given the inevitable threat of competition in their own Regulated business. It is widely believed that this may be accomplished by offering new, enhanced video and data service offerings coupled with improved quality of service for existing telephony services. Inherent in this is the need to continually improve customer satisfaction which is accomplished via the next driver (2).

2) The second most important driver is to build a new network infrastructure that can reduce the maintenance and service provisioning problems effecting the existing copper based telephone network. Offering drastically reduced maintenance, longer life, pro-active trouble resolution, and fewer service related truck rolls for fault isolation and repair as well as service activation and churn. These efforts are

all aimed at driving the high costs out of the current network and to improve customer satisfaction indices by eliminating held orders, and reducing the time intervals for any new / existing service order or the processing of trouble reports.

3) Lastly, is the driver of new revenue opportunities. Again, most of the frenzy is in video today, but the primary service opportunities for an LEC are, in our opinion, tailored to the ability to offer reliable, high capacity, two-way data services integrated with telephony and digital entertainment video services. In other words, a full service network is required. The LECs cannot afford to engineer, install and operate multiple networks for the different telecommunications markets they serve.

It is very important to note that most LECs are planning on building broadband networks which are focused on a larger portfolio of services than is generally realizable with conventional MVPD technologies. In addition, the penetration rates for known and/or anticipated service offerings are significantly different in scope than the conventional MVPD or its competition. In order to compete with an incumbent MSO, most of the LECs believe they must truly differentiate themselves from the competitor by offering significantly higher levels of choice and interactivity. In addition, the VDT requirements for common carriage basically require ample capacity to support virtually any and all comers to provide fair and equitable access to multiple information providers.

These differences require a network with switching and much greater symmetrical capacity than obtainable with the very asymmetric "broadcast optimized" MVPD architectures that are being utilized by the conventional field of MVPD players. Proof of this is evident in the recent swing away from Hybrid Fiber Coax (HFC) architectures and back to Fiber-to-the-Curb (FTTC).

The major difficulty in moving forward for the LECs is the potential high cost of entry and the fact that there are no guarantees with respect to future services revenues to justify the Broadband builds. The LEC mind set toggles between:

1) "We must move forward or we will be killed by competition", risking a premature decision based on current technology,
2) "Let's simply wait and see", further delaying the above mentioned motivations and rewards of rebuilding the network.

Next Level Communications is a developing a state-of-the-art FTTC access product that will allow an LEC to cost effectively deploy a FTTC system for telephony only (rehab or new growth) with all the hooks to evolve very easily to a full broadband capable system, or to install the same product for widescale broadband VDT or Full Service Network implementations. Our architecture is designed to work with or without a coaxial overlay to provide basis broadcast entertainment video. However, we believe that the right long term solution is to evolve away from the carriage of analog video as it pertains to the LECs broadband deployment architecture. In addition, our architecture supports high capacity, two-way data, allowing the emerging residential work-at-home users and the business data users to be served from a common network architecture platform. This is

the first network architecture to truly offer the capabilities envisioned for the National Information Infrastructure.

The following comments are offered numbered by paragraph and page number as they occur in the NOI.

Section 19-a, pg. 9 *What Changes have occurred, since the 1994 Compassion Report, in the relevant product market relative to delivery of video programming?*

Most notably are the advancements in digital technologies to support the encoding, decoding, transport, and switching of compressed digital video (and other services). Namely, MPEG 2 real-time and non-real-time encoders, cost effective/ high capacity FTTC systems, and ATM switching. Also, implementation details for how MPEG 2 video can be effectively mapped into ATM cell streams using ATM Adaptation Layer 5 (AAL5), audio and video synchronization, and mechanisms for handling cell delay variation and network jitter have been resolved. In addition, advancements in bi-directional optical transceiver devices have occurred which can drastically lower the cost of FTTC systems and help push FTTC closer to the home than is currently being contemplated by the LECs.

Section 19-e, pg.10 *Can subscribers create their own service comparable to cable by combining over-the-air broadcast service with service from a non-*

*cable MVPD and premium programming obtained from a non-cable MVPD or VCR?*

Yes a subscriber can create their own comparable service by combining off-air reception and premium channel offerings via other means than CATV assuming the subscriber is satisfied with the limited channels available off-air. DBS, fixed wireless, Satellite, and FTTC are all alternative means of integrating "premium" or subscriber specific programming such as EPPV or VOD with the broadcast off-air channels that are most often viewed in most TVs throughout the home. The main problem is restricted coverage or signal quality for existing off-air transmission or the fact that many residential areas are limiting the use of roof-top antennas via neighborhood covenants. We believe that a LEC FTTC system could be cost effectively driven to an all digital delivery if negotiations were made with city by city off-air broadcast translator stations to improve the quality and coverage of off-air reception. This would solve the dilemma of requiring digital set top boxes for each television for the majority of stations viewed. (95% of the existing viewers watch 14 or fewer channels, 98% watch 19 or fewer channels) The difficulty lies in establishing a mechanism for routing the off-air analog signals through the existing inside wire and providing a convenient transition via the set top box required for premium services. This is an easily solvable problem.

Section 53-a, pg. 26 *How will prices and services offered over VDT networks compare to the prices and services charged by the cable operators?.*

Pricing of services will have to be competitive with current CATV, DBS, or "block buster" rentals to effectively play in the consumer driven entertainment video market.

The main differentiation in VDT services will be the increased levels of interactivity and signal quality. Consumers desire the ability to watch "what they want, when they want" and are generally not impressed with the decision of cable operators to simply broadcast more and more channels. In addition the look and feel of VDT networks will be enhanced to help the user "browse" through categorized movie selections, select information about restaurants or theater events in the area, order the groceries or clothing via home shopping, access work files from home, and play games with other network users. Through advancements in circuit integration, digital signal processing, and low cost optical transceivers, the LEC will be able to build the information highway .

Section 53-b, pg. 26 *What are the technological impediments and advantages to the deployment of VDT platforms as competitive alternatives to cable systems?*

Impediments to successful VDT deployments are the high cost of entry (e.g., having to rebuild a network to every home passed), and the fact that other competitors are not saddled with the common carriage provision of VDT. VDT requires significantly more complex, costly, and capable network technology and architectures to meet the provision of multiple Level 2 information providers content in a fair and equitable manner. **We could write a book on this one, but suffice it to say that VDT greatly complicates the "regulated" Level 1 network requirements with respect to switching, transport, signaling and session control, billing, service assurance, capacity provisioning,**

**traffic engineering, conditional access and set top box ownership and control in a multiple Level 2 provider implementation.**

For the LECs, the Video Dial Tone requirements are like having to fight with one hand tied behind your back. The right solution for VDT and the LEC network is an all digital solution. Clearly, trying to be all things to all people will lead to an network offering which is not cost effectively deployed. The provision of an analog NTSC compliant video "whole house" service is clearly advantages for the consumer and the Level 2 information provider in that the number of Digital set top boxes is minimized. However, this places the LEC in the unfortunate position of having to overbuild a digital FTTC network with a lean HFC system to cost effectively offer the off air channels and as seen by many early 214 filings, forced to offer scrambled or interdicted analog delivery systems to provision services on a "a la carte" or per Level 2 provider basis. These systems are not very cost effective for CATV today and are certainly not for a competitive offering to CATV. This in time may go by the way of the dinosaur, but there may be great benefit in pushing terrestrial broadcast providers to improve their service coverage and quality to relieve the off-air burden for all competitive MVPDs. ( LEC, DBS, etc.) **(NLC seeks clarification on the LEC requirement to carry analog off-air channels as a necessary compliment to other "premium" VDT services).**

Advantages to successful VDT deployment are subscriber choice in content provider, the potential for eventual standardized CPE, monthly rates that are held in check via competition, and better service quality, reliability, and customer response to service

ordering and repair. We also believe that the successful implementation of VDT networks will lead to much lower cost implementations of consumer electronics and set top boxes due to the lower cost/less complex modulation, decreased need for forward error correction processing memory, and availability of off-the-shelf DVBS modulators currently standardized in Europe. As broadcast services move towards digital delivery, the DVBS standard may very well offer significant synergies with LEC provided VDT set top boxes. This approach would mimic analog delivery so that future TVs (and interim set tops) would inter-operate without the need for encryption. This low cost modulation format would not only cut set top box/CPE costs, but free up existing off-air broadcast service spectrum by dramatically increasing the spectral efficiency of existing RF spectrum used for AM-VSB video. **We encourage the FCC to investigate the potential use of DVBS as a potential broadcast digital standard within the United States.**

Section 53-f, pg. 27 *Are there particular market characteristics, such as relatively high population density that are necessary to support competition between VDT and Cable systems?*

Population density plays an important role in how cost effective new technologies can be implemented when expensive electronics are now being pushed closer to, if not into, the customer's premises. Higher density allows better sharing of network elements and minimizes the technological difficulties in reaching a customer from a performance (signal quality) perspective. However, customer demographics (what is the willingness and ability to pay for new services) and the ability to establish broad coverage for new

services is very important when considering where to build. Other factors such as competition, new data or business related service offerings and the need for rehabilitation will drive the LEC to be somewhat selective in the early years of VDT deployment.

Section 60, pg. 30 *Other distribution technologies.*

VCR technology is in part, responsible for the consumers drive for increased choice and interactive capabilities. Any MVPD can be upgraded to support **some degree** of interactivity and programming choice provided they are willing to spend the money to facilitate this capability. The LECs and the VDT order are naturally suited to satisfying this type of functionality via FTTC more so that any other competitive alternative to CATV.

Section 63-a, pg. 31 *What is the likelihood that a significant number of power companies might enter the market for the delivery of video services?*

It is not clear to us whether power utility companies will attempt to get into the video market. Clearly the power companies have sufficient finical resources and the existing rights-of-way (pole attachments) to contemplate entry into this market, however, it is our experience that they believe that the entertainment video market may be too highly saturated with the existing competitive solutions and that their existing infrastructure will in no way, support the transport of video services. They are however, in greater need of mechanisms to support load shedding, home energy management, and to a lesser degree, meter reading. The LECs on the other hand, are in dire need of reliable power located

close to, if not on the side of, each and every home. Reliable commercial power at field locations is needed to give the new digital network the same reliability as the old copper network. This is a tremendous synergy and opportunity for the LECs and the Power companies work together. Our belief is that power companies will work with broadband LEC build efforts to gain communications capabilities necessary to prevent them from having to build additional power plants.

Section 69-a, pg. 33 *How will competitors using different technologies take advantage of digital compression to enhance their services?*

The future of the telecommunications industry is digital. Most, if not all creation, storage, retrieval, switching, transport, and consumption of future services is or will be digital in nature. Video compression simply helps facilitate the transition to an all digital world by simplifying the storage, switching, and transport capacity requirements of digital services throughout <u>every</u> conceivable MVPD network. The biggest problem facing the industry is the embedded base of analog phones and NTSC compatible televisions and VCRs. This is not a problem that will soon go away. In the case of analog phones, this problem has been cost effectively solved by providing a economic digital to analog conversion in the LEC network close to the home. For analog video, this conversion is much more costly, largely due to the current emphasis on MPEG 2 compression and decoding. MPEG 2 decoders will, in the end, not be the dominant cost issue in performing the digital to analog conversion. The dominant cost factor will be the associated memory and processing power necessary for MPEG 2 decoding. It is not unlikely, that they may be better, more cost effective and bandwidth conserving digital

compression technologies in the near future which are based on wavelets or fractals, and not on the motion compensation and vectorial analytic methods used in MPEG 2. MPEG 2 is an excellent technology for digital compression, we do however, feel that it is important for the Commission to understand the ramifications of accepting it as the standard compression technology and that it will carry significant costs with it. MPEG decoders require a minimum of 3 to 4 Mbytes of DRAM (memory). Today, this cost is on the order of $40 per Mbytes. If it is ever the intent of the industry to cost effectively offer digital video services on each an every TV or VCR, MPEG 2 may not be the most cost effective solution.

Section 69-b, pg.33 *Is it likely that digital compression will result in convergence of costs and services among subscribers?*

On its current course, convergence on MPEG 2 will happen across all MVPDs. For the reasons mentioned above, we are concerned that there may be better solutions in the future that may be prevented by the near term (perhaps premature) convergence on MPEG 2.

Section 71a-b, pg. 33 *What are the capabilities of each technology and the types of services which each may applicable?*

Optical fiber is the wireline media of choice of the LEC. There is a large embedded base of fiber optic technology in the LEC inter-office and feeder routes today which will be leveraged to some extent for the delivery of new video and data services. Optical fiber is the favored media because of its tremendous bandwidth capabilities, immunity to noise

and long life to name a few. Optical fiber using SONET transmission standards will facilitate the evolution towards ATM switching and transport, by which, compressed digital video will be delivered. NLC and other manufactures are developing cost effective Access delivery systems to push these capabilities very close to the customer. NLC is unique in that they are integrating existing TDM service offerings with advanced ATM based entertainment video and high capacity data into the customer's home.

Another unique advantage to the all digital approach is the protection from service theft and assurance of security/privacy for all services, a big problem for the CATV industry today. In an all digital, FTTC system, video channels are switched or "enabled" in the Level 1 network and services cannot be stolen without an authorized Set Top Box and associated handshake with the network (Level 1 and 2 provider). This is accomplished without the need for scrambling or proprietary encoding methods and eliminates the black box pirate STB industry! The switched digital video solution (FTTC) is analogous to the current telephone network in that all connections between the network and the subscriber are dedicated and secure. Access to these services can not be easily provisioned without authorization for the network.

As mentioned before, lower cost and less complex modulation schemes can be utilized with FTTC systems because the need for bandwidth conservation is not as great using fiber optics as it is with other more spectrally confined delivery technologies such as coaxial cable or wire solutions where RF spectrum is a premium.

Section 71-d, pg. 34 *What changes can be expected from the widespread use of such technologies?*

The outcome of widespread availability of these technologies is the Information Superhighway will actually get built and lower cost CPE!

Section 71-f, pg.34 *Should the Commission adopt standards for any of these transmission media?*

One area for standardization may be, as mentioned before, for a standard over the air broadcast digital modulation formats just as NTSC video is today. We suggest the European DVBS technology as a potential candidate.

There is a movement towards a "standardized" baseband digital interface specification for consumer electronics and set top boxes. This interface will allow for any vendor to design CPE to hook up to a specific MVPD access technology. This concept allows CPE manufactures to develop devices to a standard independent of the MVPD system used to deliver the services. We believe that is it premature for the Commission to attempt to adopt Standards for transmission media. It is our belief that the creativity of the industry would be stifled and the motivation to build anything would be seriously hampered / delayed by FCC intervention at this point in time.

Other standards related forums are currently attempting to channel the industry towards standard/common solutions such as the ATM Forum and DAVIC. These Forums will minimize the set of acceptable access transmission technologies but more importantly,

define signaling protocols and message sets that will allow standardized CPE and applications to run on them.

Section 73-f, pg.34

This raises an important issue with respect to service derivation in the home. We believe that the ability to provision all services from a common set top box is unrealistic. Placing the necessary technology in a set top box to derive other services such POTS, data for work at home or Internet access, video telephony, home energy management, etc. would drive the of a set top box out of reach for the masses. Other service offerings can and probably will, be derived from the same coaxial interface but will be done so with specialized, high volume, low cost, network interface technologies and not derived from a common box.

Please feel free to contact us on these comments should you need further clarification. Thank you for the opportunity to comment on these important issues. There timely resolution is important to equipment suppliers, MVPDs, and ultimately the consumers as well.

Sincerely;

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