



PUBLIC NOTICE

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COMMENT SOUGHT ON IMPACT OF MIDDLE AND SECOND MILE ACCESS ON BROADBAND AVAILABILITY AND DEPLOYMENT

NBP Public Notice # 11

PLEADING CYCLE ESTABLISHED

GN Docket Nos. 09-47, 09-51, 09-137

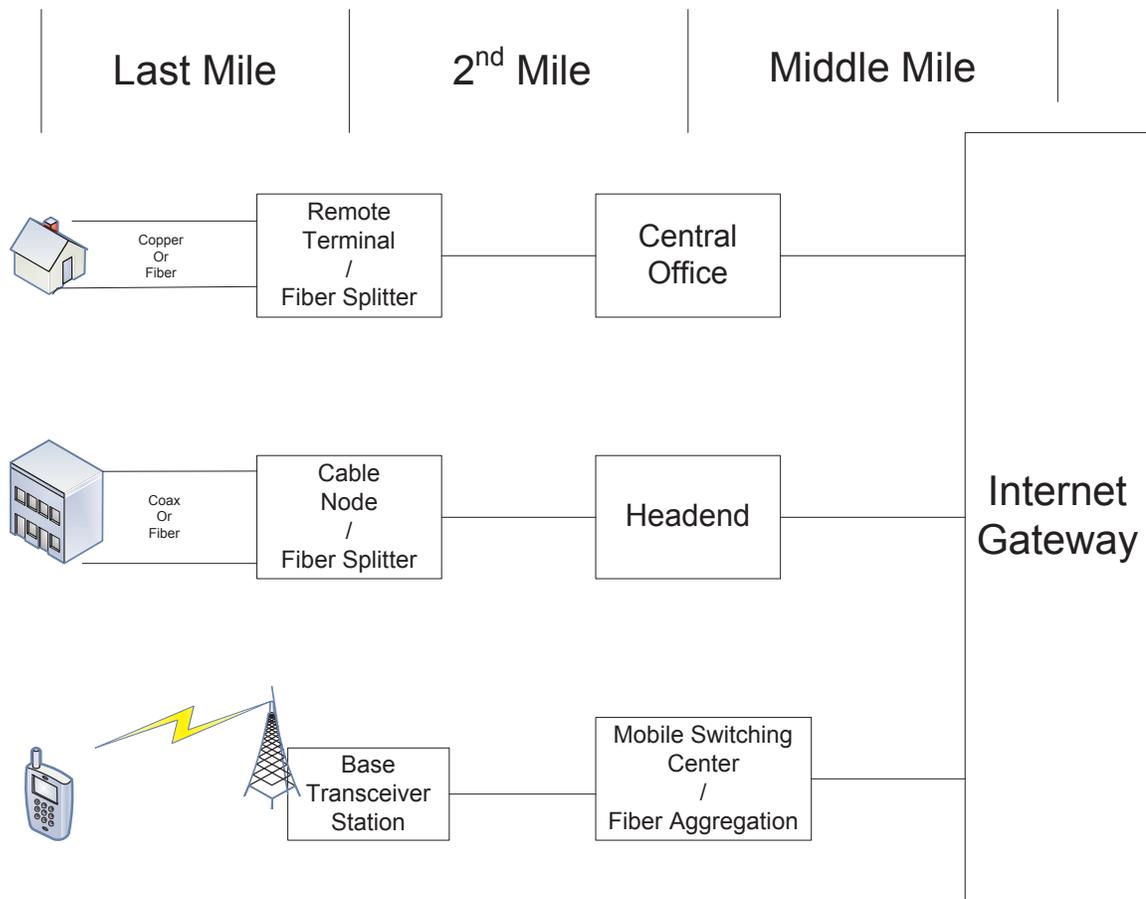
Comment Date: November 4, 2009

In the *National Broadband Plan NOI*, the Commission specifically requested that parties provide information as to whether “backhaul costs . . . stand as impediments to further broadband deployments . . .”¹ As the Commission develops a National Broadband Plan,² several entities have claimed that adequate, reasonably priced, and efficiently provided access to middle and second mile transport services and facilities play an important—if not gating—role in the economics of broadband deployment, particularly in rural, unserved, and underserved areas. In this Public Notice, we seek further information in order to understand more fully the cost and availability of these important facilities and how they relate to making broadband available to all Americans.

Terms like “backhaul,” “transport,” “special access,” and “middle mile” are sometimes used interchangeably, but each of these terms is distinct. To avoid confusion, in this Public Notice, “middle mile transport” refers generally to the transport and transmission of data communications from the central office, cable headend, or wireless switching station to an Internet point of presence. “Second mile transport” refers generally to the transport and transmission of data communications from the first point of aggregation (such as a remote terminal, wireless tower location, or HFC node) to the point of connection with the middle mile transport. We recognize that broadband service providers purchase middle and second mile transport service from other providers, self-provide, or utilize some combination in order to provide end users with broadband connectivity to the Internet. The following diagram demonstrates these definitions conceptually, and to avoid the potential for confusion, respondents may wish to employ similar terminology in preparing their responses.

¹ *A National Broadband Plan for Our Future*, GN Docket No. 09-51, Notice of Inquiry, (rel. Apr. 8, 2009) at para. 50.

² *See American Recovery and Reinvestment Act of 2009*, Pub. L. No. 111-5, 123 Stat. 115 (2009) (Recovery Act).



1. **Network Components of Broadband Connectivity.** To provide broadband service to consumers and small businesses in an area, a broadband Internet service provider needs to have adequate, reasonably priced, and efficiently provided access to both second mile and middle mile connectivity.
 - a. On a per-end user connection basis, how much middle mile capacity is needed to provide adequate broadband Internet access to that end user connection? How does the needed capacity for middle mile connectivity vary by the number of customers or usage characteristics of the customer base in a particular location? How does this capacity vary based upon the usage patterns or demands of particular end user customer segments?
 - b. On a per-end user connection basis, how much second mile capacity is needed to provide adequate broadband Internet access to that end user connection? How does the needed capacity for second mile connectivity vary by the number of customers or usage characteristics of the customer base in a particular location? How does this capacity vary based upon the usage patterns or demands of particular end user customer segments?
 - c. What are the technology options for providing adequate middle mile connectivity for the next 5-10 years?³ To what extent are these technologies available in rural or

³ See generally USTelecom, *High-Capacity Services: Abundant, Affordable and Evolving* (Jul. 2009), attached to Letter from Glenn T. Reynolds, Vice President, Policy, USTelecom, to Marlene Dortch, Secretary, Federal

unserved portions of the country? Please explain how the cost and bandwidth capacity of each technology option compares to other technology options and how those factors relate to projected demand for middle mile connectivity in different areas of the country, both rural and urban. For instance, will DS1 and DS3 connectivity over copper wire networks for the middle mile be sufficient for a community's broadband needs over the next 5-10 years? Will microwave or other wireless options be able to provide cost-effective middle mile connectivity to meet those projected needs, and how does spectrum availability impact the cost-effectiveness of these wireless options? For fiber optic networks, which technology, such as OCn, Fast Ethernet, or Gigabit Ethernet, offers the most efficient means of providing a middle mile connection to the Internet core network? Does the cost-effectiveness of certain middle-mile technologies vary by geographic area, distance, or population density? If so, to what extent?

- d. What are the technology options for providing adequate second mile connectivity for the next 5-10 years? To what extent are these technologies available in rural or unserved portions of the country? Please explain how the cost and bandwidth capacity of each technology option compares to other technology options and how those factors relate to projected demand for second mile connectivity in different areas of the country, both rural and urban. For instance, how close does this first point of aggregation need to be to households and businesses so as to ensure that those households and businesses will have adequate access to broadband both today and over the next 5-10 years? Will DS1 and DS3 connectivity over copper wire networks be sufficient for second mile connectivity over the next 5-10 years? Will microwave or other wireless options be able to provide cost-effective second mile connectivity to meet those projected needs and how does spectrum availability impact the cost-effectiveness of these wireless options? For fiber optic networks, which technology, such as OCn, Fast Ethernet, or Gigabit Ethernet, offers the most efficient means of providing second mile connectivity? Does the cost-effectiveness of certain technologies vary by geographic area, distance, or population density? If so, to what extent?

2. **Availability and Pricing of Middle and Second Mile Connectivity.** A number of different regulatory frameworks apply to the pricing and availability of point-to-point transmission services that may be used by purchasers for middle mile and second mile transport. For example, a purchaser may obtain DS3 or OCn connectivity out of a tariff or contract, and in certain situations DS1 and DS3 connectivity may be available as an unbundled network element. Packet-switched connectivity using Fast Ethernet or Gigabit Ethernet technology may be available under tariff, contract tariff, or de-tariffed service, depending on the service provider. For purposes of the National Broadband Plan, however, what matters is whether sufficient connectivity is adequate, reasonably priced, and efficiently provided in all areas of the country. As a result, we are seeking comment on the price, cost, and availability of middle mile and second mile connectivity, with a focus on rural, unserved, and underserved areas.

- a. What is the price of purchasing middle mile connectivity, broken down by relevant geographic area and technology (e.g., DS3, microwave, OCn, Fast Ethernet, Gigabit

Communications Commission, WC Docket No. 05-25, GN Docket 09-51 (Jul. 16, 2009), at 8-41 for a list and discussion of potential alternative technologies.

- Ethernet)? How much do these prices vary by length of the circuit? Precisely how do these prices for middle mile connectivity vary by category of supplier (e.g., incumbent LECs, competitive access providers, wireless providers, interexchange carriers, Internet backbone providers) and by the different regulatory treatment of that connectivity (e.g., when available as an unbundled network element, when available as a tariffed service subject to rate-of-return or price cap regulation, when subject to pricing flexibility, or when subject to no *ex ante* rate regulation)? Precisely how do these prices for middle mile connectivity vary by category of purchaser (e.g., wireless broadband service provider, cable system, local telephone company)?
- b. What is the price of purchasing second mile connectivity, broken down by relevant geographic area and technology (e.g., DS3, microwave, OCn, Fast Ethernet, Gigabit Ethernet)? How much do these prices vary by length of the circuit? Precisely how do these prices for second mile connectivity vary by category of supplier (e.g., incumbent LECs, competitive access providers, wireless providers, interexchange carriers, Internet backbone providers) and by the different regulatory treatment of that connectivity (e.g., when available as an unbundled network element, when available as a tariffed service subject to rate-of-return or price cap regulation, when subject to pricing flexibility, or when subject to no *ex ante* rate regulation). Precisely how do these prices for second mile connectivity vary by category of purchaser (e.g., wireless broadband service provider, cable system, local telephone company)?
 - c. How large are discounts from tariffed rates for middle mile and second mile connectivity obtained from incumbent local exchange companies? For example, the results of a recent special access buyer and seller survey conducted by the National Regulatory Research Institute regarding incumbent LEC special access services reported discounts from tariff “rack rates” for DS3 connectivity range from 44-68% for channel termination, 7% for fixed dedicated transport, and 68% for variable (e.g., mileage) dedicated transport charges.⁴ How accurate are these discount estimates?⁵ What commitments do customers need to make in order to obtain these discounts? Does the availability of discounts vary by geography or density zone, and if so, by how much? Do these discounts vary when competitive alternatives are present, and if so, by how much?
 - d. What discounts from tariff “rack rates” or list prices are available for other services, such as OCn, Fast Ethernet, or Gigabit Ethernet? Do these discounts vary by the regulatory treatment of the service? Does the availability of discounts vary by geography or density zone, if so, by how much? Do these discounts vary when competitive alternatives are present, and if so, by how much?
 - e. Do broadband Internet access service providers purchase circuit-mode services (such as DS1, DS3, or OCn) for the purposes of second mile and/or middle mile transport? If so, in what circumstances do they do so and to what extent? For instance, have providers opted for this strategy in areas in which packet-switched transport services such as Fast Ethernet or Gigabit Ethernet been the subject of regulatory forbearance by the Commission or because packet-switched services were either unavailable or too expensive? What are the costs associated with converting a DS1, DS3, or OCn

⁴ Peter Bluhm with Dr. Robert Loube, *Competitive Issues in Special Access Markets, Revised Edition*, National Regulatory Research Institute (Jan. 21, 2009) (available at: http://nrri.org/pubs/telecommunications/NRRI_spec_access_mkts_jan09-02.pdf) at Table 10.

⁵ If responders believe that the estimated discounts contained in the NRRI survey are not accurate, the responder should indicate whether it participated in the NRRI survey, and provide detail as to what discount it believes is more accurate.

circuit to an IP connection? How much of these costs would be avoided if a broadband ISP had the ability to purchase a transmission service that obviated the need for such conversion, such as Fast Ethernet, Gigabit Ethernet, or other packet-switched service for both the second and middle mile transport? Is functionality lost during these multiple conversions?

- f. Given current and projected demand and supply conditions, what portion of the overall cost of providing broadband Internet service to an end user is attributable to middle mile and second mile transport? Does this portion of cost vary by distance or length of the circuit, and to what extent? Using specific examples, data, and detailed analyses of deployments in different population and customer densities, please demonstrate whether and how the price of obtaining middle mile and/or second mile transport affect the business case for broadband deployment, both now and in the future.

3. **Pricing and Availability of Internet Connectivity.** In addition to obtaining both middle and second mile transport, to provide broadband Internet service to end users, broadband Internet service providers also need to purchase capacity from Internet backbone providers, such as dedicated Internet access (“DIA”) ports, which are generally sold in increments of dollars per megabits per month. The price and availability of these ports may vary based upon geographic location and whether these ports are obtained from Tier 1 or other Internet backbone providers.

- a. What is the current price per megabyte per month for a DIA port charged by a Tier 1 Internet backbone service provider? Likewise, what is the current price for other forms of Internet backbone connectivity available to Internet service providers, such as a transit agreement? What are the current prices for similar connectivity from a Tier 2 or Tier 3 Internet backbone service provider? How do the prices for Internet backbone connectivity vary as volume demanded or ordered increases? To what extent do these prices include (or exclude) Internet transit service? Is the price for Internet backbone connectivity declining over time, and, if so, at what rate do parties expect it to decline over the next five and ten year period? How much do these prices vary for different categories of purchaser?
- b. Does the price for connecting to an Internet backbone vary from location to location, and to what extent? Are prices in large cities (such as the top 25 metropolitan statistical areas) for Internet backbone connectivity less expensive than in smaller cities or towns, and by how much? If so, is this because backbone connectivity prices in smaller municipalities include a substantial a middle mile transport component? What is the range of prices, from the most urban to the most rural of settings? How much of that price range is attributable to sheer distance as opposed to the presence (or non-presence) of a Tier 1 backbone in the closest metropolitan area?
- c. What concentration ratio do broadband ISPs utilize in purchasing Internet backbone connectivity? How does an incremental additional megabit of required throughput in the last mile affect the need for second and middle mile transport service and why? Can these concentration ratios be affected by caching, and to what degree?
- d. Given current and projected demand and supply conditions, what portion of the overall cost of providing broadband Internet service to an end user is attributable to Internet backbone connectivity? Does this portion of cost vary by distance to the nearest Tier 1 connection point, and to what extent? Using specific examples, data, and detailed analyses of deployments in different population and customer densities, please demonstrate whether and how the price of obtaining Internet backbone connectivity affects the business case for broadband deployment, both now and in the future.

4. **Economics of Deployment.**

- a. Is the provision of a high-capacity fiber optic middle mile or second mile connection to a particular location a natural monopoly in some locations? If so, how can the Commission identify those locations and determine the cost of serving those locations?
- b. To what extent do providers self-provide or integrate components of middle mile and/or second mile transport? Are certain types of providers—such as cable operators—more likely to self-provide these services, perhaps because they can utilize that bandwidth not only for broadband Internet access but also for the delivery of video programming? Do wireless broadband service providers self-provide middle mile and/or second mile transport? If so, as a function of percentage all second and middle mile transport consumed by each category of broadband service provider (e.g., cable, wireless, local telephone company), how much does each category of broadband service provider self-provide that connectivity? For each category of broadband service provider, what portion of self-provided middle and second mile transport is in rural, as opposed to urban, areas? For each category of broadband service provider, what is the rate of growth of self-provisioning in rural areas as opposed to urban areas?
- c. What are the categories of the capital expenses of constructing second mile and/or middle mile transport? What are the categories of operating expenses of operating second mile and/or middle mile transport? On a per-mile basis, what are the levels of each of those categories of capital and operational expenses? What are the primary factors that affect these costs? How does distance from the nearest Internet point of presence affect each of these categories of costs? Which, and what percent, of these costs are affected by rights of way and pole attachment fees and charges? Do these charges vary based upon who owns or controls the pole, duct, conduit, or right of way? Do these costs vary by percentage of outside plant that is aerial, buried, or conduit, and if so, by how much?
- d. Do existing long-haul fiber optic service providers offer either middle mile or second mile transport service to all communities that are passed by their long-haul fiber? Why or why not? What are the cost and economics of building a local “on-ramp” or fiber access point at these locations?
- e. To what extent, if any, is the availability of adequate, reasonably priced, and efficiently provided middle mile and second mile transport infrastructure in an area limited by access to capital? Are there areas in which future or forward-looking demand would support a higher capacity circuit, but that circuit is not constructed either due to risk, uncertainty of that demand, or other capital constraint?
- f. To what extent do competing or neighboring broadband service providers work together (such as in consortia or collaboration) to upgrade and share middle or second mile facilities in places where it would not have been feasible for such upgrades to occur if those providers were operating independently? Have local and state governments encouraged or facilitated such upgrades? Alternatively, are there state laws, rules, regulations that prohibit or restrict the operations of such public-private partnerships? Are there examples of successful infrastructure sharing or public-private partnerships that might serve as models for similar initiatives nationally?
- g. If some government subsidy or action is necessary to facilitate construction of second mile and middle mile facilities, please identify the type of government action that would be adequate, such as the proposed regulatory action, explicit funding, or tax

credits. If a subsidy is necessary, identify how large a subsidy is required, both in terms of the percentage of overall deployment costs as well as an estimated number.

5. **Nature of Competition and Availability of Alternatives.**

- a. How do firms compete in providing middle mile transport services? Do firms compete on a circuit-by-circuit basis, by offering connectivity to specific points specified by the customer, or do firms “compete for the customer” by offering customers the ability to order a set of particular circuits at certain averaged or specified prices or terms? How does competition differ between middle mile transport and second mile transport services? Does the nature of competition vary between areas in which high-speed transport network facilities are already in place, as opposed to areas in which such facilities would need to be constructed in order to provide the connectivity requested by the customer? To what extent does a lack of competitive alternatives over some circuits that a particular customer demands affect or limit the ability of that purchaser to acquire or self-provide particular circuits for which alternatives may be available?
- b. What is the effect on price of the presence of a second or third facilities-based provider of middle mile or second mile transport service? More specifically, when a second provider of middle mile transport service enters the market, how are those services priced in relationship to the incumbent provider’s price, and what is the price response by the existing provider? Please provide specific examples of price competition. Does price competition vary if the second provider utilizes a different technology (such as microwave) to provide middle mile or second mile transport? If so, to what extent?
- c. To what extent do providers of either middle mile or second mile transport service compete with differentiated products? More specifically, when a second provider of middle mile transport service enters the market, does it offer a differentiated product (such as higher quality of service), and does the incumbent respond with additional differentiated service offerings? Please provide specific examples of competition through product differentiation. Is competition with differentiated products more likely if the second provider uses a different technology (such as microwave) to provide middle mile or second mile transport?
- d. Are there contractual terms and conditions in typical contracts for middle mile or second mile transport that impair or impede the ability of competitors to compete for either middle mile or second mile transport services? Do term requirements or discount contracts hinder or impede the development of competition? In either case, how?
- e. Some have asserted that the vast majority of incumbent LEC special access DS1 and DS3 revenues are generated within a minority of wire centers.⁶ What is that revenue density relationship for OCn, Fast Ethernet, Gigabit Ethernet, or other packet transport services? Please provide details as to the concentration of OCn, Fast Ethernet, Gigabit Ethernet, and other packet transport service revenues within each decile (by overall line count) of incumbent LEC wire centers. What percentage of revenues from DS1, DS3, OCn, Fast Ethernet, Gigabit Ethernet, and other packet transport services, respectively, are derived from wire centers that are not equipped to provide Digital Subscriber Line or other end-user broadband service technology?

⁶ *Id.* at 53 (citing Verizon statement that it derives 80% of its DS1 and DS3 revenues from 15% of its wire centers); *see also High-Capacity Services, supra* n. 3, at 4 (“In the case of two major ILECs, for example, 80 percent of their special access revenues in the top 50 MSAs nationwide are concentrated in just 20 percent and 17 percent of their respective wire centers within those MSAs.”).

- f. Which routes are served by more than one facilities-based provider of middle mile transport? How many and which entities offer and sell middle mile transport services to broadband Internet service providers on those routes? On routes not currently served by more than one facilities-based provider of middle mile transport, on which routes do commenters believe there to be sufficient demand to support a second provider?
- g. Which routes are served by more than one facilities-based provider of second mile transport? How many and which entities offer and sell second mile transport services to broadband Internet service providers on those routes? On routes not currently served by more than one facilities-based provider of second mile transport, on which routes do commenters believe there to be sufficient demand to support a second provider?

We understand that some of the information provided in response to this Public Notice may be considered confidential. Responses may be submitted pursuant to the Protective Order released in this GN Docket 09-51 on October 8, 2009.⁷ Parties wishing to file materials with a claim of confidentiality should follow the procedures set forth in 47 CFR ¶ 0.459. Confidential submissions may not be filed via ECFS.

This matter shall be treated as a “permit-but-disclose” proceeding in accordance with the Commission’s *ex parte* rules. See 47 C.F.R. §§ 1.1200, 1.1206. Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentations must contain summaries of the substance of the presentations and not merely a listing of the subjects discussed. More than a one- or two-sentence description of the views and arguments presented generally is required. See 47 C.F.R. § 1.1206(b). Other rules pertaining to oral and written *ex parte* presentations in permit-but-disclose proceedings are set forth in section 1.1206(b) of the Commission’s rules, 47 C.F.R. § 1.1206(b).

All comments should refer to GN Docket Nos. 09-47, 09-51 and 09-137. Please title comments responsive to this Notice as “Comments – NBP Public Notice # 11.” Further, we strongly encourage parties to develop responses to this Notice that adhere to the organization and structure of the questions in this Notice.

To the extent that Responses contain numerical data, such as, for example, pricing data in multiple geographic areas or transport technology, parties are requested to file responses in a sortable and searchable electronic format such as Excel spreadsheet. Responses may be filed using (1) the Commission’s Electronic Comment Filing System (ECFS), (2) the Federal Government’s eRulemaking Portal, or (3) by filing paper copies.⁸ Responses can be filed through the Commission’s ECFS filing interface located at the following Internet address: <http://www.fcc.gov/cgb/ecfs/>. Responses can also be filed via the Federal eRulemaking Portal: <http://www.regulations.gov>.⁹ Generally, only one copy of an electronic submission must be filed. In completing the transmittal screen, commenters should include their full name, U.S. Postal Service mailing address, and the applicable docket or rulemaking number. Parties may also submit an electronic comment by Internet e-mail. To get filing instructions for e-mail

⁷ See *A National Broadband Plan for Our Future*, GN Docket No. 09-51, Protective Order, DA 09-2168 (WCB rel. Oct. 8, 2009).

⁸ See Electronic Filing of Documents in Rulemaking Proceedings, 63 Fed. Reg. 24121 (1998).

⁹ Filers should follow the instructions provided on the Federal eRulemaking Portal website for submitting comments.

comments, commenters should send an e-mail to ecfs@fcc.gov, and should include the following words in the body of the message, "get form." A sample form and directions will be sent in reply. Parties who choose to file by paper must file an original and four copies of each filing.

Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail (although we continue to experience delays in receiving U.S. Postal Service mail). All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

- The Commission's contractor will receive hand-delivered or messenger-delivered paper filings for the Commission's Secretary at 236 Massachusetts Avenue, N.E., Suite 110, Washington, D.C. 20002. The filing hours at this location are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.
- U.S. Postal Service first-class mail, Express Mail, and Priority Mail should be addressed to 445 12th Street, S.W., Washington, D.C. 20554.

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For further information about this Public Notice, please contact Randy Clarke at (202) 418-1500.

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