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VIA ELECTRONIC FILING

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: *Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment*, WT Docket No. 17-79

Dear Ms. Dortch:

On April 11, 2018, Tim Regan, Senior Vice President, Global Government Affairs for Corning Incorporated ("Corning"), Ed Naef of CMA Strategy Consulting, and the undersigned met with the following representatives of the Federal Communications Commission: Donald Stockdale, Garnet Hanly, Kate Matraves (by phone), Dana Shaffer, David Sieradzki, Patrick Sun, Suzanne Tetreault, Joseph Wyer, and Mary Claire York of the Wireless Telecommunications Bureau; Will Adams of Commissioner Carr's Office; Erin McGrath of Commissioner O'Rielly's Office; Louis Peraertz of Commissioner Clyburn's Office; Rachael Bender of Chairman Pai's Office; and Travis Litman of Commissioner Rosenworcel's Office.

The purpose of these meetings was to discuss Corning's Report, *Assessing the Impact of Removing Regulatory Barriers on Next Generation Wireless and Wireline Broadband Infrastructure Investment: Annex 1, Model Sensitivities*, which is attached to this letter.

Pursuant to Section 1.1206 of the Commission's rules, 47 C.F.R. § 1.1206, a copy of this letter is being filed via ECFS. If you have any questions, please do not hesitate to contact me.

Very truly yours,

/s/ *Thomas J. Navin*
Thomas J. Navin
Counsel to Corning, Inc.

cc: Tim Regan

Attachment A

Assessing the Impact of Removing Regulatory Barriers on Next Generation Wireless and Wireline Broadband Infrastructure Investment: Annex 1, Model Sensitivities

January 2018

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Introduction

As a follow-on to its report *Assessing the Impact of Removing Regulatory Barriers on Next Generation Wireless and Wireline Broadband Infrastructure Investment* initially submitted in June of 2017, CMA was requested to utilize its next generation network deployment model to perform further investigation in two main areas, 1) the isolation of potential effects of a nationwide change to one-touch make-ready (OTMR) on FTTP and 5G network deployments, and 2) estimation of the impact of higher than average municipality imposed costs/fees if extrapolated for a nationwide 5G wireless fixed broadband deployment. Similar to the previous report, effects are measured in premises passed and capex investments in next gen networks. Furthermore, effects are examined in relation to the regulatory authority of the states in which they occur.

In its initial report, CMA investigated the deployment of next-generation broadband across two major axes: technological deployment vs regulatory regime. "Technological deployment" refers to the type of next generation infrastructure deployed, whether that be fully wired fiber-to-the-premises (FTTP), or fifth generation (5G) wireless fixed broadband in which wireless antennas are used to provide wireless "drops", or connections, to premises. The second axis, "regulatory regime", evaluated a next-generation broadband deployment under the current regulatory framework (the "Base" scenario) vs. a deregulated case ("NPRM") assuming the adoption of proposed regulatory changes put forth by the FCC in two of its Notices of Proposed Rulemaking.[1] For both FTTP and 5G, CMA constructed a full business model with revenues and costs at a granular census block group geographic level, and calculated the economic net present value (NPV) for a next generation network deployment. When the model was applied across the US, potential incremental gains from the NPRM were calculated by looking at those areas with a non-viable business case, i.e. negative NPV, under the current regime, that became NPV positive through proposed deregulation in the NPRM. Gains were measured in incremental premises passed in these "newly" NPV positive areas and the associated incremental capital expenditure to deploy the required network to reach those premises.

This method was utilized to investigate the combined effects of regulatory changes proposed by the FCC in the NPRMs, which can be roughly grouped into in four major areas: 1) reducing the time and cost of make-ready, potentially via OTMR, 2) reducing pole attachment costs, 3) reducing barriers to copper network retirement, and 4) accelerating legacy product discontinuance.

The analyses in this document will utilize a similar approach to isolate the level of impact that OTMR alone could have on both 5G and FTTP deployments were the rest of the proposed changes captured in the NPRM not enacted. Similar methods will also be used to examine the potential detrimental effects that higher than average fees charged by some municipalities could have on a potential 5G deployment if such fees were to become commonplace across the U.S.

Finally, all results will be summarized by the states' ability to preempt FCC pole regulations. Section 224 of the Communications Act of 1934, in which Congress directs the FCC to regulate the terms and

[1] "Accelerating Wireline Broadband Deployment by removing Barriers to Infrastructure Investment", WC Docket No. 17-84 and "Wireless Infrastructure NPRM", WC Dockets 17-79 and 15-180.

conditions of pole attachments, also provides the condition for "reverse preemption", in which states may certify that they themselves regulate pole attachment terms and conditions instead of the FCC.[2] While reverse preemption states may follow the lead of the FCC, they are not bound to adopt FCC regulations regarding pole attachments, potentially limiting the total nationwide effects of the NPRM. Currently 20 states and the District of Columbia are certified for reverse preemption.

In summary we explore the impact of higher and lower costs in the following scenarios in this paper:

Analysis of One-Touch Make-Ready Effects

- **FTTP Base:** The base model used in our June 2017 analysis reflecting today's rules and economics for FTTP deployment
- **5G Base:** The base model used in our June 2017 analysis reflecting today's rules and economics for 5G wireless broadband deployment
- **FTTP Base + OTMR:** The base model including the effects of only one-touch make-ready as proposed in the NPRM on the economics of FTTP deployment
- **5G Base + OTMR**: The base model including the effects of only one-touch make-ready as proposed in the NPRM on the economics of 5G wireless broadband deployment

Analysis of Higher Costs on 5G Deployment

- **5G Base with Higher Pole Attachment Fees:** The base model for 5G wireless broadband deployment including adjusted assumptions to reflect the potential impact of higher recurring pole attachment fees for small cells and outdoor DAS nodes
- **5G Base with Higher Application Costs:** The base model for 5G wireless broadband deployment including adjusted assumptions to reflect the potential impact of higher one-time pole attachment application fees for a wireless network including fiber backhaul
- **5G Base with Higher Gross Revenues Fees:** The base model for 5G wireless broadband deployment including adjusted assumptions to reflect the potential impact of gross revenues fees

One Touch Make Ready Effects

The FCC's NPRMs explored multiple areas for potential changes impacting both initial capital expenditures as well as the ongoing operational expenses for next generation networks. One such area was so-called "make-ready", the process by which poles are prepared for the installation of new infrastructure such as fiber optic cables. This mainly involves the planning of and actual movement of existing "attachers" on poles to make space for new equipment.[3]

[2] "Report and Order on Reconsideration in the Matter of Implementation of Section 224 of the Act: A National Broadband Plan for Our Future", WC Docket No. 07-245, p.2-4

[3] An "attacher" is an organization that rents space on a pole: e.g. the utility itself, the cable company, the municipality and the telco.

Currently, in most localities, when a new attacher wishes to put equipment on a pole, each existing attacher must first approve the plans and then send a contractor to move their own equipment to its newly designated position. The coordination among existing attachers and the multiple truck rolls required under this system to complete make-ready work can quickly increase costs, particularly in denser areas where there tend to be more existing attachers or shorter poles with less incremental room. A potential solution proposed by the NPRM is "one-touch make-ready" (OTMR), by which a single, pre-approved contractor is able to do all of the make-ready on a pole, moving all attachers' equipment to the correct location on a pole in a single truck-roll.

OTMR Impact Estimation Methodology and Assumptions

When CMA originally ran its FTTP NPRM and 5G NPRM scenarios, it incorporated a variety of effects resulting from the proposals in the NPRM, including a reduction in make-ready costs due to the implementation of OTMR. In order to isolate the potential impact of OTMR on premises passed and capital investments, the model was re-run using the Base case assumptions, but including only the positive impacts of OTMR on the business case. The two new FTTP and 5G deployment scenarios resulting from this are to be referred to as "FTTP Base + OTMR" and "5G Base + OTMR".

The resulting Base + OTMR cases were compared with their respective Base cases. More specifically we looked at those geographic areas that resulted in an NPV positive business case in the FTTP Base + OTMR or 5G Base + OTMR cases that were previously NPV negative under Base case assumptions: effectively those areas which do not pass the business case currently, but could if OTMR were implemented. The potential impact of OTMR could then be measured as the premises and capital investments attributable to these areas. These premises (and Capex) represent incremental gains over the FTTP Base and 5G Base cases that are achievable through OTMR but would remain unserved if current regulations persist.

FTTP OTMR Impact

In our original analysis, the FTTP NPRM case resulted in a potential 100.9M, or 71% of national premises passed, an incremental gain of about 26.7M premises over the FTTP Base case. It was estimated these 26.7M premises would require an incremental capital investment of $45.3B in next-gen network infrastructure to reach them. About 62% of incremental premises and Capex was in non-reverse preemption states and about 95% was in less dense rural and suburban areas.

The new FTTP Base + OTMR case estimated that impacts from OTMR alone could result in about 8.3M in incremental premises passed over the FTTP Base case and about $12.6B in associated incremental capital expenditure (see Table 1). By comparison, this is about 31% of the incremental premises and 28% of the Capex resulting from the full NPRM. Of the gains achievable by OTMR effects alone, about 61% of the incremental premises and the Capex is in non-reverse preemption states and about 75% of it is located in suburban areas.

5G OTMR Impact

In the original analysis, the 5G NPRM case resulted in a potential 106.4M, or 75% of national premises passed, an incremental gain of about 14.9M premises over the 5G Base case with an estimated

incremental capital investment of $23.9B in next-gen network infrastructure to reach them (see Table 1). About 62% of incremental premises and Capex was in non-reverse preemption states and over 95% was in less dense rural and suburban areas.

The new 5G Base + OTMR scenario estimates that OTMR effects alone result in about 5.9M in incremental premises over the 5G Base case and about $8.8B in associated capital expenditure. This is about 40% of the incremental premises and 37% of the Capex estimated to be achievable by the full NPRM. Of the gains from OTMR effects alone, about 63% of the incremental premises and Capex are in non-reverse preemption states and about 80% is split evenly across less dense rural and suburban areas.

TABLE 1: NATIONAL FTTP & 5G ROLLOUT INCREMENTAL GAINS: FULL NPRM & OTMR IMPACT[4]

	FTTP Incremental Effects				*5G Incremental Effects*			
	Full NPRM		Base + OTMR		Full NPRM		Base + OTMR	
State	Prems (K)	CAPEX ($M)	Prems (K)	CAPEX ($M)	Prems (K)	CAPEX ($M)	Prems (K)	CAPEX ($M)
Non-Preempt	16,628	$28,274	5,102	$7,686	9,346	$15,034	3,655	$5,416
Reverse Preempt	10,049	$17,039	3,230	$4,883	5,523	$8,882	2,270	$3,390
Total	26,676	$45,313	8,332	$12,569	14,870	$23,916	5,925	$8,806

Effects of Higher Costs on 5G Fixed Broadband Deployment

Many operators, particularly those involved in next generation wireless deployments, have noted in commentary to the FCC a variety of above average costs/fees placed on next generation wireless infrastructure in certain municipalities effectively prohibits the deployment and operation of such networks in these areas. Three major issues encountered by operators have been 1) unusually high recurring pole attachment fees for wireless equipment, 2) unusually high one-time pole application fees that effectively drive up make-ready costs, and 3) gross revenue fees on broadband. While make-ready and deployment applications can often include an increased time to deployment, whether via extended negotiations or longer than average processing and approval timelines – all of which can indirectly increase deployment costs – the remainder of this study focuses on the direct effects of the higher fees themselves.

Higher Pole Attachment Fees

Pole attachment fees are those recurring fees which a utility or municipal pole owner can charge an attacher for the right to have their equipment on a pole, whether that be a fiber optic cable, an antenna, or any other gear or equipment. The majority of high pole attachment fees noted by infrastructure providers and operators in the next generation wireless industry have been in regards to wireless small cells or outdoor DAS nodes (from here on collectively referred to as "small cells" or "wireless nodes") attached to municipally owned poles. As they represent an ongoing expense, high pole attachment fees

[4] "States That Have Certified That They Regulate Pole Attachments", WC Docket No. 10-101, Reverse Preempt states include Alaska, Arkansas, California, Connecticut, Delaware, District of Columbia, Idaho, Illinois, Kentucky, Louisiana, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Oregon, Utah, Vermont, Washington

can have a large impact on the viability of the business model for next generation 5G deployments in an area.

Previously, the 5G Base model assumed an annual pole attachment fee for small cells of about $20 per pole, similar to the $10-$20 fees estimated by some operators using the FCC's cost-based pole attachment formula.[5] In comparison, some operators have observed higher wireless node attachment fees in certain municipalities ranging from $500 up to $37,000 annually per pole.[6,7] Excluding some extreme outlier rates, CMA chose to investigate the impacts of high pole attachment fees for wireless nodes using a rate of $1,000 a month (or $12,000 annually) per pole.[8] This model sensitivity provides a useful illustration of the impact of higher cost pole attachment fees at a range of levels.

Higher Application Costs

Besides recurring fees for pole attachments, there is sometimes an initial one-time application fee when trying to deploy new equipment on a pole. Generally, this is meant to cover the costs to process the application. These fees are often charged on a per pole basis, are typically nominal in relation to the overall cost of deployment, and can be applied to all equipment, just wireless nodes, or some mix of the two. At higher levels, these fees can significantly raise the cost to deploy for a new network.

The original 5G Base model used a general per mile engineering and permitting cost of about $2,200 / mile. However, in some municipalities additional pole specific application fees for general wireless or wireless node use have been observed, ranging from $500 to $15,000 per pole (these do not include escrow fees for "consultant reviews" or fees for replacement poles that may also be required in some cases).[9] Considering this, CMA further investigated the impact of an additional $500 application fee per pole for all poles utilized in a 5G wireless broadband network deployment. This includes not only poles used for wireless nodes, but also those utilized for fiber connections to the small cell network.

Higher Gross Revenue Fees

While more commonly seen by cable providers, certain municipalities have looked to charge broadband and wireless infrastructure providers and operators gross revenue fees for access to municipally owned Right-of-Ways (ROWs), i.e. municipally owned poles and ducts. These gross revenue fees are generally applied as a percentage of gross revenue generated by the network in the municipality and are applied as a percent of total revenue regardless of the extent to which the ROWs are actually utilized by the operator's network. Although cable companies are permitted and often choose to pass this cost directly on to consumers, it can also be considered as a potential cost to operators, directly impacting their gross margins.

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[5] "Comments of Verizon in the Matter of 'Streamlining Deployment of Small Cell Infrastructure by Improving Wireless Facilities Siting Policies", WC Docket No. 16-421, p.8-10.
[6] "Comments of Crown Castle International Corp. in the Matter of Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Development", WT Docket No.17-79, p.10-13.
[7] "Comments of Verizon", p.8-10.
[8] "Comments of Verizon", Appendix A p.2-3.
[9] "Comments of Crown Castle International Corp.", p.10-13.

As gross revenue fees are not as common outside of the cable market, the original 5G Base case assumed a fee equaling 0% of gross revenues. A variety of operators' comments have provided examples of municipalities attempting to charge gross revenue fees of up to 5% of gross revenues, the highest percentage fee allowable under the Cable Act of 1984.[10,11,12,13] Considering this, CMA explored the effects of a 5% gross revenue fee on gross revenues which would directly impact an operators' gross margins (rather than a cost passed through to consumers, though CMA notes that this potential tax passthrough to consumers could also have a detrimental impact which we have not analyzed).

TABLE 2: HIGHER COST / FEE ASSUMPTIONS USED IN BUSINESS CASE MODELS

Cost / Fee	Description	Base Assumption	High Fee Assumption
Recurring Pole Attachment Fees	Recurring annual fees charged to locate wireless antennas / nodes on poles	$20/pole (annual)	$12,000/pole (annual)
One-Time Pole Attachment Application Fees	One-time fee for applications requesting use of poles for next generation networks	N/A	$500/pole
Gross Revenue Fees	Recurring fees charged for access to a municipalities Right-of-Ways (ROWs). Applied as a % of an operator's gross revenues	0% of gross revenue	5% of gross revenue

Methodology

CMA investigated the impact of each cost/fee on the 5G Base case deployment model separately. Rather than limiting the scope of investigation by modelling the effects of these high fees just in the areas they were observed, CMA instead attempted to more clearly demonstrate their broader impact by modelling the potential effect on 5G wireless deployments nationwide assuming a broad adoption of higher fees. For each of the three fee types, CMA re-ran its economic model using the new cost assumptions implied by the higher fees in combination with the 5G Base assumptions for all other revenues and costs. The result was three new scenarios: "5G Base with Higher Pole Attachment Fees", "5G Base with Higher Application Costs", "5G Base with Higher Gross Revenue Fees". Those premises (and associated Capex) that were economically serviceable under the original 5G Base case assumptions but were found to be no longer viable in the high cost/fee scenarios represent the potential negative impact of the associated cost/fee. We have calculated the impact of these high fees individually, but if they were combined, the effect would be greater than for any one effect measured alone.

[10] "Comments of Verizon", Appendix A p.2-3
[11] "Comments of Crown Castle International Corp.", p.10-13
[12] "Comments of ExteNet Systems, Inc. in the Matter of Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Development and the Matter of Accelerating Wireline Broadband Deployment by Removing Barriers to Infrastructure Investment", WT Docket No.17-79 and WT Docket Np. 17-84, p.40-43
[13] "S.66 - Cable Communications Policy Act of 1984", Congress.gov, https://www.congress.gov/bill/98th-congress/senate-bill/66 (December 2017)

Impacts of Higher Costs

CMA's original 5G Base case estimated a total of 91.5M, or 65% of premises (homes and SMBs) nationwide were in areas that were economically viable for deployment.

Comparing the 5G Base with Higher Pole Attachment Fees scenario to the 5G Base case, it is estimated that a nationwide introduction of higher fees would result in 28.2M fewer premises passed, or 31% of the 5G Base case results, and an associated $37.9B in forgone network deployment Capex.

Comparing the 5G Base with Higher Application Costs scenario to the 5G Base case, it is estimated that a nationwide introduction of higher fees would result in 7.9M fewer premises passed, or 9% of 5G Base case results, and an associated $11.6B in forgone network deployment Capex.

Comparing the 5G with Higher Gross Revenue Fees scenario to the 5G Base case, it is estimated that a nationwide introduction of such fees would result in 9.4M fewer premises passed, or 10% of 5G Base case results, and an associated $13.6B in forgone network deployment Capex.

TABLE 3: 5G BASE CASE AND FOREGONE PREMISES & CAPEX DUE TO HIGHER THAN AVERAGE FEES

	5G Deployment - Negative Effects Due to High Costs					
	Higher Pole Fees		**Higher App. Costs**		**Higher Franchise Fees**	
State	Prems (K)	CAPEX ($M)	Prems (K)	CAPEX ($M)	Prems (K)	CAPEX ($M)
Non-Preempt	**-17,287**	**-$23,275**	**-4,943**	**-$7,235**	**-5,798**	**-$8,416**
Reverse Preempt	**-10,869**	**-$14,621**	**-2,976**	**-$4,362**	**-3,570**	**-$5,193**
Total	**-28,155**	**-$37,896**	**-7,919**	**-$11,596**	**-9,368**	**-$13,610**

CONCLUSION

This follow-on to *Assessing the Impact of Removing Regulatory Barriers on Next Generation Wireless and Wireline Broadband Infrastructure Investment* investigates both the potential effects of one-touch make-ready as well as the potential impact that high fees can have on next generation wireless networks. Regulatory changes allowing OTMR have the potential to significantly impact the economic feasibility of next generation fiber and wireless networks in many areas across the county, enabling wider deployment. Higher costs/fees on next generation wireless network operators have the potential to significantly decrease investment in and further deployment of such networks as they cause the business case for such deployments to become untenable in a wider range of areas.