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October 26, 2011

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
2300 Yonge Street
PO Box 2319, 27th Floor
Toronto, ON
M4P 1E4

Dear Ms. Walli:

RE: Application by Canadian Distributed Antenna Systems Coalition ("CANDAS");
Board File No.: EB-2011-0120

We are writing to file the responses of CANDAS to the interrogatories of Board Staff in respect of CANDAS' Reply Evidence.

For ease of reference, where we have provided a reference to CANDAS' answers to Board Staff's first round interrogatories on CANDAS' Application and Written Evidence, we have used the following protocol: *e.g.* CANDAS (OEB)-1, would be a reference to CANDAS responses to Board Staff's question #1 on CANDAS' Application and Written Evidence.

Where we have provided a reference to CANDAS' answers to Board Staff's second round interrogatories on CANDAS' Reply Evidence, we have used the following protocol *e.g.* CANDAS (OEB) Ware REPLY-1, because the numbering of Board Staff's questions restarts for each witness.

We will file two paper copies of the responses as soon as possible.

Yours very truly,

(signed) H.T. Newland

HTN/ko

cc: Mr. George Vinyard
All Intervenors

EB-2011-0120

IN THE MATTER OF the *Ontario Energy Board Act, 1998*, S.O. 1998, c. 15, (Schedule B);

AND IN THE MATTER OF an Application by the **Canadian Distributed Antenna Systems Coalition** for certain orders under the *Ontario Energy Board Act*, 1998.

RESPONSES TO INTERROGATORIES OF

BOARD STAFF

(on the Reply Evidence of the Applicant, CANDAS)

October 26, 2011

INTERROGATORIES FOR DR. ROGER WARE

Ref: Par. 5 of 'Reply Evidence of Dr. Roger Ware' - "Pole networks are a public good and there is a public interest in the sharing of these facilities. Both federal and provincial regulatory agencies have endorsed this view and have mandated access by communications carriers for attachments."

Question 1:

From your experience in competition and regulation, what is or would be the effect of a policy to mandate sharing of facilities, if such sharing is shown to reduce value to the stakeholders for whose benefit the facilities were originally put into place (for example, through reductions in safety or reliability, or increases in costs)? In your view, is it appropriate for a regulator to impose conditions for access that keep the original beneficiaries whole in terms of their interests? Why or why not?

Response:

Ultimately, the stakeholders are the public. Therefore any action taken to further the public interest will not reduce the value to stakeholders, measured properly. Pole networks are assets whose use should be directed toward the public interest, broadly defined.

It is not clear who is meant by "original beneficiaries" – if this is a term for the ratepayers, then they will be *better off* as a result of an attachment decision which creates a stream of rental income. Moreover, the ratepayers have already paid for the original investment in the pole network.

Since safety is regulated, there is no reason why any reduction in safety should occur. The same is true of reliability.

Ref: Par. 5 of 'Reply Evidence of Dr. Roger Ware' - "The success of new entrants in Canadian wireless markets is a stated goal of government policy."

Question 2:

(a) Please define the term "success" for purposes of this statement, or provide a reference to a suitable definition in the policy statements of governments.

(b) Please provide a reference to inclusion of this goal in the mandate of the Ontario Energy Board or any Canadian energy regulator.

Response:

(a) See for example "Competition Principles: Promoting a Competitive Post-Auction Marketplace" (Section 4 of *Framework for Spectrum Auctions in Canada)* available at http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01626.html#section4, as well as *Policy Framework for the Auction for Spectrum Licences for Advanced Wireless Services and other Spectrum in the 2 GHz Range* (Industry Canada, November, 2007) available at http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08833.html. See also Industry Canada, *Consultation on a Policy and Technical Framework for the 700MHz Band and Aspects Related to Commercial Mobile Spectrum*, November 30, 2010, page 1, available online at: http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf09947.html

(b) The Ontario Energy Board has a mandate to regulate in the public interest. In the 2004 CCTA Order the Board cites the "Public Interest" several times, for example, when it says that "Duplication of poles is neither viable nor in the public interest". In my view, there is no difference between the public interest on whose behalf the OEB was acting in the CCTA decision and the public interest to which I refer in my evidence.

Ref: Par. 7 and 8 of 'Reply Evidence of Dr. Roger Ware' - "Certain public goods exhibit both "economies of scale" and "economies of scope." Economies of scale are the reductions in cost (i.e., cost per unit) that occur when the scale of production of a single product is increased. Economies of scope, on the other hand, are the reductions in total cost in respect of two or more products, where the production of such products results in cost efficiencies."

Hydro Pole networks, which require the investment of large sunk costs, exhibit the characteristics of both economies of scale and economies of scope. As for the former, pole networks can, once constructed, accommodate increased electricity loads without the need for further investment in the network. As for the latter, the use of the pole network for multiple uses (eg. electricity distribution and telecommunications) results in lower costs for both applications. In the result, Hydro pole networks are public goods that should be regulated in the public interest.

Question 3:

When a public good, with a finite production capacity, could be employed safely to produce only one of the two alternative benefits, but not both, should the public good be used:

(a) to produce the benefit with higher economic value? or

(b) to produce the benefit with lower economic value? or

(c) to produce one of the benefits without any regard to the economic value of the benefit?

Response:

(a) The hypothetical posed in this question is not relevant because it assumes that the two products cannot be produced together safely. That is not the case here.

(b) Please see the response to 3(a) above.

(c) Please see the response to 3(a) above.

Question 4:

Under the following assumptions: (a) a finite number of communication attachments can be installed on a power pole, (b) demand for communication attachments exceeds capacity, (c) wireline and wireless attachments generate equal revenue per pole attachment (d) wireless attachments require significantly greater space than wire line attachments; would it produce greater public benefit (revenue) if the public good (power pole) is employed for wireless attachments or wireline attachments?

Response:

I do not accept the validity of these assumptions, particularly assumptions (b) and (d) for the reasons set out in the Reply Evidence of Tormod Larsen.

There is, however, a simple answer to this question. Set the rate for third party attachments and then allow those parties, who are willing to pay the tariff, to attach their facilities to the pole, regardless of whether their facilities are wireline, wireless or some other facility entirely.

Ref: Par. 9 of 'Reply Evidence of Dr. Roger Ware': "Natural monopolies create a classic rationale for regulation. Absent regulation, it can be expected that monopoly control and pricing will be exercised, to the detriment of consumers and efficiency. The regulation of a natural monopoly is often said to create a "regulatory compact" amongst the firm, its investors, and its rate-paying customers, whereby investors receive a reasonable return on their investment and customers pay fair, cost-based rates for service."

Question 5:

Is it Dr. Ware's view that wireless attachers and/or their customers for wireless services would be participants in the "regulatory compact" on an equal basis with electricity customers in their use of electric distribution poles? If not, please explain the relevance of this statement as it applies to the CANDAS application. If it does apply, please confirm that the statement implies that rates for wireless attachments should be cost based and sufficient to provide a reasonable return on investment.

Response:

No, wireless service customers are not part of the regulatory compact in a traditional sense. However, I note that a benefit from renting the use of THESL poles would accrue to ratepayers, who are part of the regulatory compact.

The statement that is referenced at paragraph 9 of my Reply Evidence was intended to expand on the concept that utility pole networks are a public good. The statement was not made in order to justify any particular rate for attachments.

Ref: Par. 12 of 'Reply Evidence of Dr. Roger Ware': "The efficient way to allocate access to the THESL poles is to mandate access at just and reasonable rates – not to discriminate among categories of users as Dr. Yatchew seems to be advocating."

Question 6:

(a) Please clarify whether you agree or disagree that different rates would be just and reasonable, and not discriminatory, if categories of users impose different costs through their use.

(b) In your view, would a requirement to allocate access be met even if the cost-based rate fails to support the business case of a category of user?

Response:

(a) This question seems to be asking whether rates for attachment should be cost based, and I agree that they should. I have not been asked to carry out any quantitative analysis of costs in this proceeding.

(b) Rates should be based on non-discriminatory principles that apply to all attachers, and should not depend directly on any particular "business case."

Ref: Par. 25 of 'Reply Evidence of Dr. Roger Ware': "For example, Dr. Yatchew points to the activities of American Tower Corporation and Crown Castle USA. However, neither of these companies operates in Canada, nor to my knowledge has any plans to do so."

Question 7:

How does Dr. Ware monitor the business plans of American Tower Corporation and Crown Castle USA?

Response:

For further support of statements regarding these companies, please see the Reply Evidence of Johanne Lemay, at page 20.

Board staff requests a response from Dr. Ware to the following interrogatory which is also addressed to Mr. Larsen below.

Ref: Par. 1.2 (ii) 'Reply Evidence of Mr. Tormod Larsen': "While there is no evidence that femtocell, picocell and WiFi wireless access technologies can reasonably be deployed to provide blanket, seamless wireless coverage over wide geographic areas, to the extent that these wireless technologies evolve, the relatively higher density of wireless access nodes and backhaul links that these technologies require, means that in order to efficiently deploy over wide geographic areas, they also will require attachment to a network of uniform, contiguous support structures, of much lower average height, in relative terms, than macrocell sites. Indeed, limited outdoor WiFi deployments, including one in downtown Toronto, are located on utility poles."

Question 8:

(a) Hypothetically speaking, if the Board rules in favour of CANDAS, directing LDCs to accommodate the requests of wireless communication carriers to allow attachment of antennas and associated equipment on power poles, does the above statement imply that the LDCs can expect requests from several different communication access technology providers asking for space on power poles for attachment of antennas and associated equipment?

(b) If the answer to question 8(a) is yes, how should the finite communication space on power poles be allocated to different vendors? (i) first come first served; or (ii) auctioned off thorough public bidding; or (iii) leased for the highest price a site could fetch through negotiations?

Response:

(a) As indicated in the Reply Evidence of Tormod Larsen, DAS networks require only 4 poles per square km to accommodate the DAS "node" equipment, less than the number of poles per square km required to accommodate the power supply boxes of the cable attachers who already share use of the poles. Plus, they take up less space on poles than the equipment occupied by cable attachers. As a consequence, it is not likely that, as a result of mandated wireless attachment, demand will exceed space available for attachments to power poles. Furthermore, DAS networks such as the one proposed by CANDAS in Toronto are designed to operate as multi-carrier networks, meaning that one DAS network can actually be used to serve multiple wireless carriers. Given these considerations, it is not clear that LDCs would receive requests for space on power poles from "several" different carriers.

(b) Please see the response to 8(a) above.

INTERROGATORIES FOR MR. TORMOD LARSEN

Ref: Par. 1.2 (ii) 'Reply Evidence of Mr. Tormod Larsen': "While there is no evidence that femtocell, picocell and WiFi wireless access technologies can reasonably be deployed to provide blanket, seamless wireless coverage over wide geographic areas, to the extent that these wireless technologies evolve, the relatively higher density of wireless access nodes and backhaul links that these technologies require, means that in order to efficiently deploy over wide geographic areas, they also will require attachment to a network of uniform, contiguous support structures, of much lower average height, in relative terms, than macrocell sites. Indeed, limited outdoor WiFi deployments, including one in downtown Toronto, are located on utility poles."

Question 1:

(a) Hypothetically speaking, if the Board rules in favour of CANDAS, directing LDCs to accommodate the requests of wireless communication carriers to allow attachment of antennas and associated equipment on power poles, does the above statement imply that the LDCs can expect requests from several different communication access technology providers asking for space on power poles for attachment of antennas and associated equipment?

(b) If the answer to question 1(a) is yes, how should the finite communication space on power poles be allocated to different vendors? (i) first come first served; or (ii) auctioned off thorough public bidding; or (iii) leased for the highest price a site could fetch through negotiations?

(c) If the answer to question 1(a) is no, are there options other than the power poles available for these alternative technology suppliers to attach their antennas to?

Response:

(a) No. As stated in the Reply Evidence of Ms Lemay and Mr. Larsen, there is no evidence that small-cell technologies, such as femtocells and picocells, are being deployed outdoors to achieve blanket coverage, independent of macrocells.

(b) Not applicable.

(c) As stated above and in the Reply Evidence of Mr. Larsen and Ms Lemay, there is no evidence that small-cell technologies are being deployed outdoors to achieve blanket coverage, independent of macrocells.

Ref: Par. 1.2 (ii) 'Reply Evidence of Mr. Tormod Larsen': "Each DAS network is a hybrid of wireline and wireless components. DAS networks typically include many kilometres of fiber links that connect centrally located hub equipment facilities to distributed communications nodes with antennae that provide wireless access to end-user mobile devices. A uniform, contiguous network of support structures that permit attachment of the antenna component of DAS networks at uniform heights of between 9-14 metres, is required in order to deploy a DAS network efficiently over wide geographic areas. Wherever utility pole infrastructure exists, it is distinctly preferable to attach both the wireline and wireless components of a DAS network to utility poles, not only for reasons of economic efficiency, but also for technical and functional reasons."

Question 2:

Hypothetically speaking, if on a certain street there was space on power poles to install either the wireline or wireless components of DAS technology but not both, based on your professional experience which one out of the following three would yield the highest economic value and why?

(a) to install the wireline components on poles and the wireless components on other structures?

(b) to install the wireless components on poles and the wireline components on other structures?

(c) to install both the wireless components and the wireline components on other structures?

Response:

(a), (b) and (c)

Mr. Larsen does not understand this hypothetical because it appears to assume that DAS "node" equipment and cabling, such as the equipment and cabling illustrated on the last page of Appendix "B" of his Reply Evidence, must be attached to every pole in DAS system. This is not in fact the case.

In fact (as illustrated at page 3 of 5 of Appendix "A" of Mr. Larsen's Reply Evidence), at most, DAS networks require only four poles per square km to accommodate the DAS "node" equipment. This appears to be less than the approximately five poles per square km required in a CATV network to accommodate the larger CATV power supply boxes.

That being said, DAS networks, like CATV and wireline telecommunications networks, do require approximately 90 fibre attachments per square km in addition to the periodic placement of node equipment. However, Mr. Larsen has never seen a case where there was not enough room on utility poles for the addition or one or more fibre attachments.

As a result, Mr. Larsen has never seen a case where the owner of utility pole infrastructure had to choose between wireline and wireless carriers' attachments due to lack of available capacity on existing utility poles.

Ref: Par. 5.2 'Reply Evidence of Mr. Tormod Larsen: "For purposes of assessing the engineering, mechanical and safety implications of wireless carriers' attachments to electrical utility poles, the relevant considerations are the (i) method of attachment, (ii) dimensions and weight of the attached items and (iii) the configuration of cabling and equipment on poles. In this regard, contrary to what is suggested by Mr. Starkey and Ms Byrne, there are no material differences between wireless and wireline attachments to poles."

Question 3:

(a) What is the average life expectancy of a DAS antenna?

(b) Is the life expectancy indicated in response to 3(a) based on technical obsolescence of the components or some other criteria?

(c) What is the life expectancy of the hardware and brackets with which the antennas are attached to the poles?

Response:

(a) The life expectancy of a DAS antenna is >20 years.

(b) The information in (a) is based on experience. Cellular antennas deployed in the 1980s and 1990s are still operational. Antennas are technology agnostic and completely passive; as a result they generally remain useful and require very little maintenance or repair, provided they are installed and weatherized properly and except in instances where the poles are not knocked down or struck by lightning.

(c) The life expectancy of the hardware and brackets that attach the antennas is also >20 years.

Ref: Par. 5.3 'Reply Evidence of Mr. Tormod Larsen': "Set out in Table 3 below is a comparison of the approximate dimensions and weight of remotely placed communications equipment, which is commonly located on utility poles: (i) wireline CATV power supply equipment; (ii) WiFi access point equipment (including antenna unit) and (iii) DAS node equipment (including antenna unit):"

Question 4:

Hypothetically speaking, if 600 mm is the maximum allowed width of communication space on power poles, is it true that DAS antenna height is greater than 600 mm, which would it make it impossible to fit within the allowed communication space?

Response:

The question asks us to assume that the maximum allowable width of the communication space is 600 mm and asks whether DAS antenna are greater than 600 mm in height. DAS antenna are typically much less than 600 mm in width and no, DAS antenna are not always greater than 600 mm in height. See for example the 580 mm Cellmax antenna, described at http://www.cellmax.se/products/15dbi-high-efficiency-tri-sector.

Side-arm antenna installations in the hypothetical communication space would also be installed on the "field side" of the pole, *i.e.* the opposite side to the "road side", which faces the road. This is because the road side is, generally speaking, already occupied by telecommunications or CATV equipment and fibre cabling. The Toronto DAS antennas currently attached to THESL poles are installed on side-arms placed on the "road side" of THESL's poles.

Ref: Diagram Titled "Typical Wireless Equipment Attachment Installed on a 35' Common Utility Distribution (LDC) Pole"

Question 5:

(a) Please confirm our understanding of the diagram, that item #12, the antenna, would not fit into Communication Space (B), but would need to be installed in the Separation Space (C). If this is not correct, please explain. Please confirm also that part of the Clearance Space (D) would need to be used to support item #7, and that this would not fit in the Communication Space.

(b) Please refer also to Lemay Evidence dated October 11, 2011, page 15: "Typical outdoor DAS radio units, such as the Delta Node fiber optical DAS remote unit that can be pole mounted, weigh from 12 Kg to 24 Kg, depending on the configuration chosen." Is the "radio unit" referred to by Mr. Lemay the item that is represented as item #12 on the diagram? If not, please indicate which item it would correspond to on the diagram.

Response:

(a) **Not confirmed**. As shown in the referenced diagram, there would be a single point of attachment for both the fibre cabling and antenna components (item #12) of a DAS node installation within the Communications Space (B). Furthermore, as per CANDAS(OEB)Larsen REPLY-4 above, the antenna would be attached on the field side, rather than the road side of the pole and would extend out and away slightly from the pole, meaning that the only physical attachment would be in the Communications Space (B).

Regarding the power backup component (item #7) of a DAS node installation, the Clearance or "Unused" Space (D) represents the ideal location to mount this equipment. This is no different than for the power backup units associated with wireline CATV or telecommunications networks (item #7 of the diagram titled "Typical CATV Power Supply Installed on a 35' Common Utility Distribution (LDC) Pole"), which are larger and are attached to poles at more frequent intervals than DAS nodes would be in a DAS network.

Mr. Larsen also notes that from a technical perspective, there is no reason why the communication space should be limited to two feet; the communication space could be expanded, for example, were poles to be replaced with taller poles.

(b) The Delta Node remote unit corresponds to the antenna portion of item #12 in the referenced diagram, although Ms Lemay has no indication that the diagram is meant to depict the Delta Node equipment referenced in her Reply Evidence.

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