

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*.

**INTERROGATORIES OF
CANADIAN ELECTRICITY ASSOCIATION
(on the evidence of the Applicant, CANDAS)**

August 9, 2011

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The Canadian Electricity Association (“CEA”) submits the following interrogatories of the Canadian Distributed Antenna Systems Coalition (“CANDAS”). CANDAS is a coalition of three Canadian member companies: ExteNet, Public Mobile and DAScom. Any reference in these interrogatories made to CANDAS or the Applicant should be understood to mean CANDAS as a collective, and/or any one of the CANDAS member companies.

I. CANDAS Application

1. At paragraph 2.1, page 3 of the application, CANDAS states that “[i]n making the CCTA Order, the Board drew no distinction between wireless and wireline carriers or equipment.”
 - (a) Are there any notable differences between wireline and wireless attachments?
 - (b) Did the Board explore these differences in the CCTA Decision?
 - (c) Please identify all of the specific references contained within the evidentiary record of the proceeding that led to the CCTA Order where the subject of wireless attachments to utility poles was discussed.
 - (d) Please provide specific references contained within the evidentiary record of the proceeding that led to the CCTA Order to support the claim at paragraph 2.1, page 3 of the application that the CCTA Order “required” electricity distributors to grant Canadian carriers access for the purpose of attaching their wireless equipment to utility poles.
2. Please provide copies of the agreements that THESL entered into permitting the attachment of both wireless and wireline equipment charging the OEB approved rate per pole. Reference is made to these agreements at paragraph 2.2, page 3 of the application.
3. The Application states that Canadian carriers “require” access to poles at paragraph 2.8, page 4 of the application.
 - (a) Please indicate what efforts have been made to seek attachment agreements from private sector suppliers of structures that are capable of accommodating DAS antenna attachments.
 - (b) Please identify all potential attachment options other than utility poles (i.e. buildings, roof tops, traffic lights, street lights, bus shelters, street signs, billboards and signage).
4. CANDAS states that electricity distributors have “monopoly power” at paragraph 2.9, page 4 of the application.
 - (a) Please provide all evidence to support this claim.

- (b) Please provide CANDAS' definition of "monopoly power" as referred to at paragraph 2.9, page 4 of the application, having regard to (i) available alternatives for the attachment of wireless antenna; and (ii) alternative technologies available to wireless carriers to enhance capacity and network coverage.
5. Please provide CANDAS' definition of "essential facilities" as referred to at paragraph 3.9, page 6 of the application, having regard to (i) available alternatives for the attachment of wireless antenna; and (ii) alternative technologies available to wireless carriers to enhance capacity and network coverage.
6. At paragraph 3.10, page 7 of the application, reference is made to the Settlement Agreement that was entered into on October 20, 2004. Please provide the reference in the Settlement Agreement that provides wireless carriers with access to pole tops for the purpose of attaching their wireless equipment.
7. At paragraph 3.10 of the application, "Canadian carriers as defined in the *Telecommunications Act*" (the "Act") are referenced. Please confirm which members of CANDAS are Canadian carriers as defined in the *Telecommunications Act*, and which are not.
8. Please provide the names of each of the wireless carriers that are currently deploying DAS technology in Canada and identify the markets in which these wireless carriers are seeking to attach DAS systems to utility poles.
9. At paragraph 3.11, pages 8-9, the CANDAS application asserts that it would be "quite remarkable" if the OEB never turned its mind to the issue of whether the definition of "Canadian carrier" included wireless carriers between May, 2004 (when the CCTA proceedings were convened) and March, 2005, when the OEB released its decision. Isn't it true that the DAS equipment, technology and design that is the subject matter of this application (i) was not widely commercially available in Ontario between May, 2004 and March, 2005 and; (ii) was not being deployed by any wireless carriers as the primary means of providing network coverage in Ontario between May, 2004 and March, 2005?
10. At paragraph 3.12, pages 9-10, CANDAS cites the March 2005 decision of the OEB in the CCTA proceeding, and states that "...it is equally important that costs be properly allocated and that the electricity distributor (and ultimately, the electricity ratepayer) receives its fair share of revenue." Without conceding the applicability of this decision to the matter at issue, please indicate CANDAS' view on how this OEB conclusion is to be accommodated if CANDAS' recommended terms and rates of access are adopted by the OEB.
11. CANDAS describes the three main elements of a DAS system at paragraph 5.1, page 12.
- (a) Is CANDAS seeking to attach each of the three main elements of a DAS system described, namely, (i) the antenna and low power radio units; (ii) the fibre optic cabling that connects the nodes to the network; and (iii) the central hubs; to the utility poles?

- (b) Is CANDAS seeking to attach equipment to the pole tops and to the communications space?
12. Paragraph 5.2, pages 12-13, describes the wireless and wireless components of a DAS network, and state that the fibre optic cabling required is “most effectively and efficiently deployed by aerial suspension from support structures in public rights-of-way or established utility easements.”
- (a) Have CANDAS members examined deploying a new structure within the rights-of-way to support their antenna systems and ancillary components?
- (b) Is CANDAS aware of DAS deployments in any jurisdiction that are deployed without use of utility poles?
- (c) Are there any other pieces of equipment that form part of a DAS network (i.e. back up batteries) that require attachment to utility pole infrastructure or rights of way that are not identified in the application? If yes, please identify those pieces of equipment and describe the nature, dimensions and weight of the required attachment.
13. The Macro Cell Site technology is described at paragraph 5.5, page 13 of the application.
- (a) Please identify the wireless carriers currently operating in Canada that operate their wireless businesses using Macro Cell Site technology.
- (b) What percentage of wireless carriers operating in Canada today operate their wireless networks using Macro Cell Site technology?
14. At paragraph 5.7, page 14 of the application, CANDAS states that the “upfront capital costs of a DAS network may be higher than that of Macro Cell Site deployment designed to cover the same geographic area”.
- (a) Please provide a comparison of the respective upfront capital costs to deploy a DAS network over an assumed geographic area as compared to a Macro Cell Site deployment. Please provide all underlying assumptions.
- (b) What is the cost difference, in percentages, of deploying a network utilizing existing utility infrastructure, versus new infrastructure in rights-of-way?
15. At paragraph 5.8, page 14 of the application, reference is made to a “partially completed network” that DAScom and ExteNet are constructing with a local fibre provider in Montreal.
- (a) Is this DAS network attached to utility poles?
- (b) How many nodes are there in each of these networks?
- (c) How many carriers are tenants on the networks?

- (d) How many attachments were made to the utility infrastructure in each network?
16. At paragraph 6.3, page 15 of the application, reference is made to CANDAS seeking to attach to 790 poles within the City of Toronto.
- (a) Are the proposed nodes designed to accommodate multi-carriers?
 - (b) If yes, how many attachments per pole are contemplated?
 - (c) Is it one attachment per pole for each piece of equipment described at paragraph 5.1, page 12 of the application, i.e. one antenna and a neutral host piece of equipment for each node/carrier?
 - (d) How much existing fiber is scheduled to be utilized to support the 790 node deployment?
17. At paragraph 6.6, page 16 of the application, CANDAS states that without access to existing power and lighting poles upon commercially reasonable terms and conditions, neither the Toronto DAS Network, nor any other DAS network deployment in Toronto, would be economically or technically feasible.
- (a) Please provide coverage characteristics, broadband capabilities monthly/annual costs, and/or per subscriber costs of DAS to traditional wireless Macro Cell Site based systems.
 - (b) Please provide any other particulars in support of this statement, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.
18. Paragraph 6.7, page 17 of the application discusses the costs of creating a new corridor in Toronto, and notes that construction of a duplicative system of poles within City rights-of-way is not permitted under the terms of the Municipal Access Agreement (the "MAA").
- (a) Has any CANDAS member proposed deploying stealth pole/infrastructure to support such a node network to the City of Toronto?
 - (b) Has any CANDAS member proposed utilizing underground conduit infrastructure to support their fiber network?
19. Public Mobile's use of Macro-Cell Sites is noted at paragraph 7.10, page 21 of the application.
- (a) Please confirm that Public Mobile is currently using Macro Cell Sites to serve its customers.
 - (b) What is the difference in total cost between Public Mobile's "Macro Cell Site" alternative currently being used by Public Mobile and the forecasted costs of the Toronto DAS Network proposed by ExteNet and DAScom?

- (c) What is the total cost being paid by Public Mobile for use of the Macro Cell Site in the exact service area that is proposed to be covered by the Toronto DAS Network?
- 20. CANDAS references discriminatory actions on the part of THESL, whereby access is granted to some wireless attachers, but not DAScom, at paragraph 10.11, page 29. How can equal access to poles by all Canadian wireless carriers be achieved, in light of the limited space on utility poles for attachments and the need for utility providers to accommodate their own future growth initiatives (i.e. smart grid requirements)?
- 21. CANDAS maintains, at paragraph 11.4, page 39 of the application, that if its nodes are not permitted to attach to Toronto utility poles, "the lost opportunity created by such consumer choices... simply cannot be recouped". Please explain this statement in light of the availability of in-building DAS solutions.

II. Written Evidence of George Vinyard - July 26, 2011

- 22. At question 3, pages 3-4 of Vinyard's evidence, Vinyard discusses ExteNet's interest in this proceeding as a party to the development of Toronto's "DAS Network Design, Provisioning, and Services Agreement" with Public Mobile.
 - (a) Why did ExteNet offer a service when they had no agreement with THESL?
 - (b) What is the nature of the agreements that ExteNet has with Cogeco and DAScom as well as Public Mobile?
 - (c) How many carriers beside Public Mobile were intending to sign, or signed, agreements with ExteNet for the Toronto system?
 - (d) If ExteNet's revenues increase with little or no additional infrastructure by providing a service to multiple carriers, is it not in the public and rate-payers' interest that the pole-owner also receives increased revenue from carrying the signals of these additional carriers?
 - (e) Who owns the existing attachments?
 - (f) If multiple owners, then how many does each owner have?
 - (g) How large is the "partially constructed" network, geographically?
 - (h) How many attachments are part of the "partially constructed" network, and of what type?
 - (i) How large was the DAS network to be, geographically?
 - (j) How many attachments were to be part of the full network, and of what type?
 - (k) Explain the reason for utilizing Cogeco and DAScom to provide attachment rights.
 - (l) What is the duration of the contract with Public Mobile?

- (m) Why is the development of a DAS network not feasible without THESL's poles?
 - (n) Please indicate if, during the planning stages of the DAS Network, installation of node attachments on structures besides THESL and THESI poles were considered, and, or whether there was/is a "Plan B" scenario whereby installation of node antennae would not be limited to utility poles?
23. At question 3, page 3 of Vinyard's evidence, he references "...expressions of interest from Public Mobile and other new entrant wireless carriers with respect to DAS network deployments in areas outside the City of Toronto." Please identify the new entrant wireless carriers that expressed interest in DAS networks in areas outside of Toronto.
24. At question 3, page 3 of Vinyard's evidence, he states that "ExteNet's objective for participating in this proceeding...is to obtain appropriate rulings from the OEB to make the ongoing development of DAS network infrastructure in Ontario a feasible alternative for meeting the needs of wireless carriers". Please provide evidence of what the other alternatives are for meeting the needs of wireless carriers .
25. At question 5, page 4 of Vinyard's evidence, reference is made to "approximately 80 attachment agreements with over 35 utilities, most of which involve attachment to power poles".
- (a) Please also identify the number of agreements that ExteNet Systems, or any other member of CANDAS has entered which do not involve attachment to power poles.
 - (b) Please identify the parties to, and describe those agreements which do not involve power poles.
 - (c) Please provide copies of all of these attachment agreements.
 - (d) For each of these DAS networks, please indicate what percentage of all of the wireless attachments that constitute that network rely on distribution utility poles to attach to, and what percentage rely on attachments to other types of infrastructure (traffic lighting pole, side of building, rooftop, macro cell tower, stand alone tower, billboards, signage, etc.).
26. At question 6, page 5 of Vinyard's evidence, Vinyard, in discussing his recommended terms and conditions of access to serve the interests of various constituencies in this matter, notes that "[b]y virtue of the nature of DAS network technology, specifically the substantial fiber optic cabling component and the large number of antenna sites...DAS deployments require substantial up-front capital investments".
- (a) The City of Toronto MAA agreement, noted in the Lemay-Yates Report at page 26, records the fiber optic cabling required for Toronto as 690 kilometres. Please elaborate on the relative costs of DAS antenna mounts on hydro poles relative to the overall project costs.

27. At question 6, page 5 of Vinyard's evidence, he states that terms must "establish time frames for the processing of attachment permits or license applications and for the performance of any required "make ready" work that are both reasonable and reasonably predictable" and must provide for "the duration of any attachment [to be]...of sufficient length to justify the necessary capital investments..."
- (a) The Ontario Energy Board requires its LDC's to be aggressive with meeting the agreed upon OEB filing for asset management and new electrical connection requirements. Do you believe it to be reasonable to have LDC's stop this work to provide CANDAS members with "prompt" service for any make-ready work required for their proposed installations? It is reasonable to believe this will occur?
 - (b) If ExteNet succeeds in building its DAS network, should it be considered a monopoly provider of DAS sites and be required to publish tariff rates and standard terms and conditions?
 - (c) Considering that Public Mobile expects these antennae to have a 4-5 year life (see written testimony of Brian O'Shaughnessy, question 10, page 7), why is there a necessity for "assurances that the asset will continue to be available for use over a sustained period" later described to be "at least 15 years" with a minimum of three 5-year extensions – a total of 30 years?
28. At question 6, page 5 of Vinyard's evidence, Vinyard states that "[w]ithout such provisions, DAS technology cannot be made available in a given market and any policy mandating access to electricity distribution poles is likely to be severely undermined, if not rendered entirely illusory."
- (a) The claim that "without such provisions, DAS technology cannot be made available" suggests that it will not be available in wholly underground areas that have been the norm since the mid-1970's. Is this what CANDAS believes?
 - (b) If DAS technology is not made available, what services will not be provided in areas with electric utility poles? In areas without electric utility poles?
 - (c) In 2004 during the CCTA application to the OEB about access to power poles, the OEB reviewed the negotiated agreement terms and conditions and did not apply regulatory oversight to the agreement but only determined an annual attachment rate. What has changed for the OEB to now consider CANDAS' application for oversight on the agreement terms and conditions?
29. At question 6, pages 5-6 of Vinyard's evidence, Vinyard states that "...if the public interest is to be served, access to electricity distribution poles for telecommunications facilities attachments cannot be granted on a basis that is neither competitively neutral nor non-discriminatory". Vinyard goes on to state that "...to minimize the potential for abuse of monopoly power in the negotiation of attachment agreements, ExteNet requests that approved terms and conditions of access be published in a tariff or rates schedule".

- (a) Although Industry Canada requires Cell Tower owners to provide access to other carriers, do any cell tower owners publish attachment rates and terms and conditions?
 - (b) Since ExteNet's services are offered "for profit", how is it that the "public interest" is not served if electric utility poles, owned either privately or by rate-payers, are offered in negotiated attachment agreements whether confidential or not?
 - (c) Are all ExteNet agreements open to the public?
 - (d) Does ExteNet have an agreement with THESL? If not, why is there a concern about the nature of the agreement that Cogeco and DAScom have with THESL?
 - (e) Describe the nature of the monopoly in an environment where supports for DAS antennae can be other poles and structures.
30. At question 8, pages 7-8 of Vinyard's evidence, Vinyard addresses what he views as reasonable terms and conditions governing the duration of any given pole attachment.
- (a) Since Public Mobile has stated that its requirements are for 4-5 years, why should an attachment, once granted, continue indefinitely?
 - (b) The typical pole attachment agreements are for 5 years in Ontario. What is the basis for CANDAS' view that it should receive preferential treatment with longer term agreements?
 - (c) Would the attacher commit to pay the outstanding rent owing if it terminates before 30 years?
31. At question 8, pages 7-8, Vinyard references a proposed "minimum initial term of 15 years, with a minimum of three, five year renewals".
- (a) What is the expected physical and economic/depreciation life of the DAS pole apparatus and also the BTS without which the DAS pole apparatus cannot function?
 - (b) How does this relate to the terms proposed, considering the rapid pace of technology development and obsolescence in the telecommunications industry?
 - (c) Please elaborate on the circumstances and conditions associated with termination. For example, if a municipality initiated a road widening, how would the participants manage and fund the associated relocation and rebuilding?
32. At question 9, page 8 of Vinyard's evidence, Vinyard addresses terms for assuring compliance with safety regulations.
- (a) Wireless equipment evolves rapidly and varies widely and therefore presents novel situations to utilities, whereas, the long established standards and

practices for traditional cable attachments to poles have been essentially stable for many years, even with the introduction of fibre cables (with respect to the attachment aspect). Please comment on the extent that wireless equipment of the type used by ExteNet, and in the industry generally, presents novel situations regarding safety, security, engineering and operational issues.

33. At question 10, page 9 of Vinyard's evidence, he states that "[t]he principal method for avoiding the imposition of costs on utility ratepayers should be the establishment of appropriate rates..."
- (a) Please provide the rates that attachers pay to access utility poles in other jurisdictions as well as the rates that attachers pay in other jurisdictions for attachments to structures other than utility poles.
 - (b) Please provide all underlying assumptions to support this response.
34. At question 10, page 9, Vinyard goes on to state that "[s]uch an approach appears to be reflected in the current rates for attachments established by the Board." The evidence alludes to the 2005 CCTA decision when Vinyard references "current rates for attachments established by the Board".
- (a) Please confirm that the CANDAS Application is limited to wireless attachments that can all be contained within the communication space as defined in the CCTA decision.
 - (b) If CANDAS believes that there is additional space outside of the communication space where wireless attachments may be placed, please provide the legal basis for that position from the CCTA decision.
35. At question 11, pages 9-10 of Vinyard's evidence, he provides his opinion on the reasonable terms and conditions relating to liability in relation to DAS attachments.
- (a) So that participants in this proceeding may better understand the magnitude of exposure to any possible liability, please provide the approximate value of the apparatus placed in an individual DAS installation (hypothetically, a utility boom truck could accidentally sideswipe some or all of the DAS apparatus on a pole).
36. At question 12, page 10 of Vinyard's evidence, he references apparent discrimination "between wireless and wireless attachments".
- (a) What are the differences observed in such situations?
 - (b) Why does ExteNet believe these differences are not valid for a DAS type installation and wireless equipment installations in general?
 - (c) What are the engineering, design and equipment differences between a typical DAS attachment and a typical wireline attachment?

37. At question 12, pages 10-11 of Vinyard's evidence, Vinyard discusses the laws and practices which have evolved in the U.S. regarding telecommunications attachments to electricity poles, and ExteNet's experiences reaching agreements with U.S. utility companies.
- (a) Please identify the utilities that ExteNet has failed to reach an agreement with.
 - (b) Please describe the differences between the Canadian Standard CSA C22.3 No.1-10 that puts strict limitations on the use of pole-top wireless attachments and the U.S. Standard(s) that allow the FCC to reject a blanket refusal to allow pole-top antenna attachments.
38. At question 13, page 12 of Vinyard's evidence, he suggests that the viability of DAS networks depends on whether the OEB grants the relief that CANDAS is seeking in relation to Toronto utility poles.
- (a) Regardless of apparent difficulty in Toronto, please explain why DAS is not a viable option in other areas of Ontario and appealing to the interests of wireless service providers?
 - (b) If DAS is a benefit primarily in congested urban areas, please explain why LDCs outside urban areas should be concerned or involved at all?
 - (c) Given the design specifications for the Toronto DAS network, what alternatives can be deployed in the event that poles are not available? For example, the following would appear to be suitable: low rise commercial buildings, telephone booths, transit shelters, telephone service poles and other street furniture .
39. At questions 14, page 12, Vinyard states that "[i]f the Board grants the relief that CANDAS is seeking as described above, it will mean that ExteNet and DAScom, along with other potential providers of DAS network infrastructure and services, will have the opportunity to obtain contracts from wireless carriers..."
- (a) Please confirm that the DAS application is a one time backbone service which is thereafter resold to resellers, i.e. that following the first installation of a DAS network application, there is no opportunity for other backbone providers to also attach.
 - (b) Please indicate whether the first provider of DAS network infrastructure that attaches, for all intents and purposes, becomes the monopoly provider of DAS.

III. Written Evidence of Tormod Larsen - July 26, 2011

40. At question 2, page 2 of Larsen's evidence, he states that he has focused on DAS technology and on designing, equipping and optimizing DAS networks. How many outdoor DAS networks has Larsen been responsible for designing for wireless telecom providers? Please provide details of each of these projects (size, scale, location).

41. At question 2, page 2 of Larsen's evidence, reference is made to the "essential need to deploy DAS networks on existing utility poles". Leaving initial and recurring costs aside, please explain how virtually the same coverage and capacity can or cannot be achieved by deploying DAS nodes on other than utility poles.
42. At question 3, page 3 of Larsen's evidence, he describes the key components and characteristics of outdoor DAS network technology, including a BTS Hub and DAS antennae.
- (a) Please compare the node site as described in this section with the mechanical "attachment" that securely grips or clamps a linear cable to a pole.
 - (b) Where are the BTS Hubs located?
 - (c) How many pieces of equipment of a DAS network have to be attached to a utility pole on a per pole basis? Please answer with reference to the equipment described on pages 2 and 3 of Larsen's evidence.
 - (d) Please identify any other attachments that are not referenced in the written evidence.
 - (e) Since 9-14 metres is the length of a typical distribution pole, the installation of DAS antennae would almost always require a new pole. How does this not suggest a very expensive installation if the poles need to be replaced?
43. At question 4, page 3 of Larsen's evidence, Larsen states that "[a] DAS network is typically designed to meet the known needs...for improved coverage and/or enhanced capacity in a specific geographic area". Aside from DAS, what other ways do carriers have to achieve "improved coverage and/or enhanced capacity"?
44. At question 4, page 3 of Larsen's evidence, Larsen states that "[t]he design process begins with a survey and inspection of existing utility infrastructure within the coverage area." Were other support structures other than existing utility poles were surveyed and considered by CANDAS for Toronto, specifically?
45. In relation to the evidence provided at question 4, page 4 of Larsen's evidence:
- (a) What are the Industry Canada requirements to limit harmful radiation exposure for locating an antenna away from the general public?
 - (b) From line workers?
 - (c) From occupied indoor spaces?
 - (d) What specific regulations are being referred to here?
 - (e) How would electric utility workers be protected?
 - (f) Since the "public right of way" where poles are located is generally a street or a lane, it's not clear how that provides separation from the public. Would

electric utilities bear any potential liability for hosting antennas if there is harm to the public?

46. At question 4, pages 3-6 of Larsen's evidence, Larsen discusses how DAS networks are typically designed and constructed.

- (a) In relation to Larsen's evidence at page 4, A(i) - Node Site Locations, given the densities of initial and full deployment, what flexibility in horizontal deployment is available? That is, if a target pole turns out to be unsuitable due to capacity, age, aesthetic or other reasons, how far afield can the next best pole be chosen – one pole along the route, two, ten, etc.? Or would adjacent and taller antenna mounts be sought so as to eliminate the difficult spot?
- (b) In relation to Larsen's evidence at page 4, A(i) – Node Site Locations, if a competing DAS service provider appeared, how would their coverage and node placement generally be similar to or different from the approach taken by CANDAS and DAScom? If the competing DAS provider also went for a full and dense build out, does that mean an additional large number of nodes in the public space?
- (c) In relation to Larsen's evidence at page 4, A(i) – Node Site Locations, how is line-of-sight propagation to end users achieved with only 3-7 nodes per square kilometre given the presence of trees and buildings?
- (d) Larsen's evidence at page 4, A(ii) – Antenna Height, provides that typical DAS networks have from 3 to 7 node sites per square kilometre. Elsewhere in CANDAS' application, the Lemay-Yates report at page 26 provides evidence that the number of intended DAS nodes in Toronto to be 730. Given that the area of the City of Toronto is 641 km², this suggests 1.1 node sites per square kilometre, rather less than the 3 to 7 node sites per square kilometre described. Please elaborate on the initial and projected node density. If the upper range of 7 is applied across the full city, does this mean a full and dense build out would reach some $7 \times 641 = 4487$ nodes?
- (e) In relation to Larsen's evidence at page 4, A(ii) – Antenna Height, if the preferred height is 9-14 m, please identify the other structures that could be utilized.
- (f) In relation to Larsen's evidence at page 4, A(ii) – Antenna Height, given the example of the antenna node installation by DAScom in Exhibit D, as well as electric utility preference for avoiding the street corner for reliability and safety, does the number of node sites go beyond 7 per square kilometre?
- (g) In relation to Larsen's evidence at page 4, A(ii) – Antenna Height, do all the existing DAS installations in Toronto meet the requirements of CSA C22.3 No.1-10?
- (h) In relation to Larsen's evidence at page 4, A(iii) – Fibre Connectivity, explain the need for DAS to have dedicated fibre rather than use existing fibre already installed.

- (i) In relation to Larsen's evidence at page 5, A (v) – Physical Access, is it not true that ease of access to antennae would be greatest if the installation would be on a structure that had no energized high voltage electric lines attached to it as shown in Exhibit C slide on the Las Vegas deployment?
- (j) In relation to Larsen's evidence at page 5, A (v) – Physical Access, explain how ease of access would be a characteristic of a pole-top installation where qualified electric utility line staff with live line capabilities would be required.
- (k) In relation to Larsen's evidence at page 5 that there is a "vast number...of utility poles in most populated areas" - as most developments since the 1970's in Canada have been underground, where there are no or only single utility poles, how is DAS offered to modern residential developments?
- (l) Larsen states at page 5 that "the design process begins with a survey and inspection of existing utility infrastructure within the coverage area." When a DAS network is in the initial design stages, are other support structures other than existing utility poles surveyed?
- (m) Larsen states at page 5 that "utilizing utility poles has therefore been the predominant approach for the design of DAS networks".
 - (i) This statement implicitly acknowledges that there are other support structures that can be utilized for the design of DAS networks. Please describe what other approaches for the design of DAS networks have been utilized. Please provide full details of these installations.
 - (ii) Please describe the differences in terms of utilization of the pole between a typical DAS network and a wireline attachment. Please compare using the following metrics as well as any others that are relevant: (i) number of attachments per pole; (ii) location of each attachment; (iii) extent of make ready work; (iv) safety considerations; (v) amount of fibre on the pole, and; (vi) nature, dimensions and weight of the equipment being attached.
- (n) In relation to Larsen's evidence regarding a typical configuration of a DAS node site, at page 5, A(i) – Pole Top Access, Larsen describes a pole top antenna as being part of a typical DAS node configuration. Are pole top antennae typically considered to be located within the "communications space" on a pole?
- (o) In relation to Larsen's evidence regarding a typical configuration of a DAS node site, at page 5, A(i) – Pole Top Access and its reference to "designated communications space", on average, what percentage of the communications space would all the constituent elements of a typical DAS network occupy on a pole?
- (p) In relation to Larsen's evidence regarding a typical configuration of a DAS node site, at page 5, A(i) – Pole Top Access and its reference to "designated

communications space”, on average, what percentage of the space below the communications space would a typical DAS network configuration occupy?

- (q) In relation to Larsen’s evidence at page 6, A(ii) Remote Radio Unit, (iii) Backup Battery Power Unit and (iv) Fibre Optic Interconnection, as well as Exhibit D, slides 3 and 4, are the sizes and weights for the radio unit, the battery power unit, the fibre optic interconnection and the pole top antenna always the same and as shown on Exhibit D, slides 3 and 4? Please provide the average sizes and weights for each of these pieces of equipment.
 - (r) Larsen states, at page 5, that a DAS network has the “potential to spread the capital cost of the initial DAS deployment costs over multiple users who can be added at relatively low incremental design and construction cost”.
 - (i) Please provide evidence to support this claim including projections on capital cost recovery and potential recurring revenues to be generated from multiple users of the installed network.
 - (ii) Please supply any business plan projections available to support this claim.
47. At question 5, page 7 of Larsen’s evidence, Larsen states that Toronto’s DAS Network design “called for all the antennae to be mounted on cross-arms attached to poles in or near to the communications space”, resulting in the need for more node sites in Toronto. How many more antennae are required with the use of the communications space?
48. At question 6, pages 7-10 of Larsen’s evidence, Larsen describes how DAS networks differ from traditional Macro Cell Sites or self-contained Micro Cells with mounted antennae, and the benefits which flow from this.
- (a) In relation to Larsen’s evidence at page 7, please indicate whether it is true that DAS is an alternative wireless technology which can offer some economic benefits but it does not offer wireless services that aren’t already provided by macro-cell wireless?
 - (b) In relation to Larsen’s evidence at page 7, please indicate if, with a DAS system, it is true that increases in the demand for high data rate services can only be met through the addition of nodes or higher capacity nodes, similar in concept to Macro Cell Sites?
 - (c) In relation to Larsen’s evidence at pages 8-9, please confirm that all the benefits of DAS networks described herein are conveniences, efficiencies and potential efficiencies, but that there are no additional services that DAS provides over Macro Cell wireless.
 - (d) In relation to Larsen’s evidence at page 8, (i) Improved coverage, reference is made to DAS technology use “...for years in tunnels, canyons, indoors and other hard to reach areas:”

- (i) Please provide examples, Canadian if possible, of this usage.
 - (ii) Please explain how these can be successful without the preferred heights of 9-14 meters identified in Question 4.
 - (iii) If DAS technology can be deployed in tunnels, canyons and indoors where there are no utility poles, what structures were used for attachments in these examples?
- (e) In relation to Larsen's evidence at page 8, (i) Improved coverage and (ii) Increased capacity, why can these benefits not be achieved through continued use of Macro Cell Sites, or all the other options available?
- (f) In relation to Larsen's evidence at page 9, (iii) Greater spectrum efficiency, did Industry Canada state that DAS on electric utility poles was required to increase the spectrum efficiency?
- (g) In relation to Larsen's evidence at page 9, (v) Improved signal transport and backhaul efficiencies:
- (i) If backhaul is 30% of a carrier's operating expense and macro-cell technology does not have the antennae required, or the backhaul requirements of DAS, and its tower electronics system is similar to that of DAS, is DAS more expensive to operate?
 - (ii) What else would have to occur for the DAS operating cost to be competitive to Macro Cell Sites besides the desired low rate for the pole attachment?
- (h) In relation to Larsen's evidence at page 10, (vi) Flexibility and scalability, using Larsen's lawn sprinkler analogy, many sprinkler heads mean many hoses and higher monitoring and maintenance. Please confirm that this translates into higher operating costs.
- (i) In relation to Larsen's evidence at page 10, page 10, (vi) Flexibility and scalability, should competing DAS providers appear, what rules if any would be required regarding use of the same pole, adjacent pole or nearby pole? What entity would establish and manage those rules?
49. At question 7, page 11 of Larsen's evidence, Larsen references "work in international standardization bodies" as illustrative of the fact that distributed network architectures are the way of the future.
- (a) Please identify the work by international standardization bodies that require DAS antennae to be on electric utility poles.
 - (b) If DAS networks are the way of the future, please elaborate on its value as presented to and as desired by DAS wireless service provider customers and potential customers in terms of a) time-to-market b) initial cost c) recurring cost.

- (c) Please comment if this value varies with DAS customer type – that is, a new entrant might prioritize time-to-market whereas an established provider might prioritize cost savings relative to other choices.
50. At question 8, page 11 of Larsen's evidence, Larsen describes examples of initial DAS deployments in Canada.
- (a) Please indicate if it is likely that BCTel (now Telus) and Rogers describe these installations as DAS networks?
 - (b) Were these installations installed only on electric utility poles?
 - (c) What are the pole attachment rates and the methodology for access to Montreal's street light poles?
51. At question 9, page 12 of Larsen's evidence, Larsen states that electric utility poles are a "practical necessity for outdoor DAS deployments" and that "[t]here are no real practical alternatives to electricity utility infrastructure for large scale outdoor DAS deployments."
- (a) Please provide evidence to support the statement that "there are no real practical alternatives to electricity utility infrastructure".
 - (b) What alternatives, if any, exist for wireline service providers in lieu of attachments to utility poles?
 - (c) In downtown office areas and in newer residential communities, there can be little or no electric utility poles. Since this presumably is a major part of the DAS market, are there no alternative methods of building a network in these areas?
 - (d) Please indicate whether it is possible to deploy a DAS network in downtown Toronto using an indoor DAS network?
 - (e) Are you aware of any U.S. cities that deploy indoor DAS networks for concentrated areas (downtown core, specific shopping areas, large office towers, etc.)?
 - (f) Explain the inconsistency between the statement that "there are no real practical alternatives to electrical utility infrastructure for large scale outdoor DAS deployments" and the photos of the Las Vegas deployment in Exhibit B that show attachments to non-electric utility poles.
 - (g) If there are no electric utility poles available, as in the downtown of cities like Winnipeg, does this preclude the deployment of DAS networks?
 - (h) If a CANDAS member uses streetlight poles, would it not have to bury fibre optic cables and electric service lines?

- (i) Since CANDAS members can own poles within public right-of-ways and private properties, why can CANDAS not use its own poles or other poles (eg. telecom poles, commercial parking lot poles)?
 - (j) The City of Toronto has undertaken a city wide program with a single provider (Astral Media) of street furniture, including transit shelters with electrically illuminated advertising space. This would seem to fit a DAS deployment (single provider, well placed at street corners, electricity present, uniform construction) and at a scale of 730 installations would surely attract their interest. This would be pertinent in Toronto, which has been presented in this evidence as a key starting point for ExteNet in Ontario. Please outline what discussions with alternate providers of antenna space (including Astral Media) have taken place regarding the Toronto installation and the outcome of those discussions.
 - (k) Please provide evidence to support the contention that power poles are a necessity for a DAS network rather than a preferred option or an economic convenience?
52. At question 9, page 13 of Larsen's evidence, he states that "[t]he estimated impact on construction costs could exceed \$200,000/node site" if utility poles cannot be used for the DAS network.
- (a) Please provide all the underlying assumptions to support this cost estimate.
 - (b) Please provide a breakdown of the major cost components of this estimate.
 - (c) Please identify how often this trade-off is assessed in actual projects, with examples.
 - (d) Please provide evidence to support the contention of the report that if node costs are \$200,000 per node, the Toronto DAS network would be "economically unfeasible". In particular, please provide all recurring revenue and expense projections from multiple users of the installed network over the 15 year attachment period.
53. Exhibit B, slide 6, entitled "DAS – The wireless solution for modern cities" and Exhibit C, slide 2, entitled "Las Vegas – DAS Nodes" provide photos showing antennae and remote radio units on street lighting pole (Exhibit B) vs. a standalone pole adjacent to a street lighting pole (Exhibit C).
- (a) What are the total dimensions (width and height) of each component of this equipment?
 - (b) Does this installation fit entirely within the two foot communications space?
 - (c) Why did ExteNet use a stand alone pole in Las Vegas rather than attaching to the adjacent street lighting pole?
54. Exhibit C, slide 5 shows photos of Toronto DAS Sidearm Installations.

- (a) Please explain why the presence of one cylinder, one finned box, and one flat box does not count as three attachments.
 - (b) Please explain why, when mounting on a wood pole, which results in six holes for mounting bolts drilled completely through the pole, this does not count as six attachments.
55. At Exhibit D, slide 4, the pole profile in the drawing shows the total assembly of DAS equipment between 3.9 and 6.4 meters elevation above ground, spanning a total of 2.5 meters or over 8 feet (not counting the additional grounding connection to the base of the pole).
- (a) Please explain how the space occupied by the total assembly of DAS equipment relates to the area of the pole often known as the communications space, considered to be one or two feet in most jurisdictions.
 - (b) When a DAS attachment is approved, does ExteNet consider it covers 360 degrees around the pole?
 - (c) What concerns or restrictions does ExteNet foresee with attachments of everyday items such as signs, banners, planters, etc., also to poles?

IV. Written Evidence of Bob Boron - July 26, 2011

56. At question 1, page 2 of Boron's evidence, he states that he is "a Co-Founder and President of Jade Tower Inc., a company focused on owning and managing wireless communication (cellular) towers and antenna sites...."
- (a) Given the foregoing professional experience, please provide a breakdown of market prices that exist for the different types of communication towers and antenna site alternatives utilized for wireless attachments (tops of buildings, sides of buildings, stand alone towers, utility poles, traffic lights, billboards, signage, attachments inside buildings, etc.).
57. At question 4, page 3 of Boron's evidence, Boron states that "there is no alternative but to attach DAS equipment to existing power poles, [thus] access to such power poles does constitute a monopoly-controlled resource".
- (a) Please clarify whether Boron's evidence is that there are no alternatives but to attach to existing power poles?
 - (b) If the answer to (a) is yes, please provide the relevant particulars in support of this position, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents.
 - (c) If the answer to (a) is yes, please explain this answer by reference to Exhibit B of Larsen's written testimony showing a DAS deployment does not need to attach to existing electric utility poles and the Lemay-Yates report at page 26, which declares with respect to Toronto that "730 DAS nodes throughout the city of which approximately 90% would be on hydro poles" (meaning 10% are

not) and notes only 10 of Montreal's 12-15 Videotron DAS nodes are on hydro poles.

- (d) If the answer to (a) is no, please explain the alternatives options that exist, including providing the relevant particulars of same.
 - (e) Please define the term "monopoly-controlled" as it is used in this context.
58. At question 5, page 3 of Boron's evidence, Boron states that "[i]t would be strange indeed if power poles were classified as essential facilities for cable companies and wireline attachers, but not for wireless attachers."
- (a) Please define the term "essential facilities" as it is used in this context.
 - (b) Please explain the extent to which Boron and/or Public Mobile, Inc. view THESL's poles as "essential facilities" within the context of Public Mobile's provisioning of wireless services in and around Toronto.
59. At question 7, page 4 of Boron's evidence, Boron states that "[l]ack of capacity can never justify discriminatory access." If the pole line does not have adequate additional capacity, why is it discriminatory to permit existing wireline attachments to remain and possibly allow their owners some additions, provided that their attachments do not overstress the pole?

V. Written Evidence of Brian O'Shaughnessy – July 26, 2011

60. At question 3, page 3 of O'Shaughnessy's evidence, he describes the nature of Public Mobile's interest in the proceeding, including "the creation of a level playing field with our competitors who do have access to power poles in Ontario" and desire for "access to such poles on commercially reasonable terms and conditions".
- (a) Please indicate whether and to what extent Public Mobile's competitors use access to utility poles for purposes of constructing, maintaining and/or operating an outdoor DAS in Toronto.
 - (b) Please identify the difference in compensation paid for wireless attachments associated with tower structures, traffic lights, signage, roof tops, other alternatives CANDAS and/or O'Shaughnessy is aware of, and distribution utility poles.
 - (c) Since Public Mobile is currently operating in the marketplace with an alternative technology, why is access to utility poles a requirement for "good public policy" and "in the public interest"?
61. At question 9, page 6 of O'Shaughnessy's evidence, he states that four times as many transmission towers, or "Cell Sites" would be required to transmit the frequencies Public Mobile is licensed to transmit.
- (a) Is it true that cell towers alone could offer the service that Public Mobile wanted to provide?

- (b) Why would Public Mobile have to build these towers? Were there not enough available already from the various communication tower owners?
62. At question 10, page 7 of O'Shaughnessy's evidence, O'Shaughnessy states that Public Mobile looked to DAS technology as a new way of providing increased cell density.
- (a) How are other carriers providing increased cell coverage in areas where DAS deployment is not feasible?
 - (b) If DAS is not feasible in an area, how do wireless carriers increase their cell density?
63. At question 10, page 7 of O'Shaughnessy's evidence, O'Shaughnessy states that the Toronto DAS Network would have been built "to provide the capacity to meet the needs of Public Mobile's customers for four to five years. Public Mobile also entered into agreements with ExteNet to build a DAS network on the Island of Montreal, in partnership with Hydro Québec and the Municipality of Montreal."
- (a) Was the planned Toronto deployment to last only for 4-5 years?
 - (b) Was the Toronto deployment planned to be increased or decreased after that?
 - (c) Please provide copies of all said agreements for development of a DAS network on the Island of Montreal between Public Mobile and ExteNet.
 - (d) Please provide copies of all said partnership agreements involving Hydro Quebec and/or the Municipality of Montreal.
 - (e) Are any other parties involved in the development of this Island of Montreal network? If so, please provide details of their roles and any understandings and agreements that have been reached.
64. At question 12, page 8 of O'Shaughnessy's evidence, O'Shaughnessy states that Public Mobile switched to Macro Cell Site strategy as a result of an inability to proceed using DAS technology.
- (a) Please confirm that Public Mobile was able to offer its service despite the loss of the DAS network.
 - (b) Please provide the location of each of the "Macro Cell Sites", and please indicate whether and to what extent each site is located on a roof top, balcony, special-purpose structure or other location (specify if other).
 - (c) Please provide copies of the agreements entered into by Public Mobile associated with the said Macro Cell Site strategy including pricing paid by Public Mobile for these attachments.
 - (d) Please indicate how the costs of using the Macro Cell Site differs from the projected costs of using the DAS network.

65. At question 14, page 9 of O'Shaughnessy's evidence, O'Shaughnessy states the Public Mobile will consider restoring its network build planning process with ExteNet if "pole access is affirmed on commercially reasonable terms and conditions". Do commercially reasonable terms include a benefit to the electric utility that owns the poles and is liable for their existence?
66. At question 15, page 10 of O'Shaughnessy's evidence, O'Shaughnessy states that antennae should be installed at the top of a utility pole to facilitate better node coverage.
- (a) Given that pole-top antennae installations always require the replacement of the pole with a larger pole, is it not more cost-effective and practical to utilize an existing space that is already designated for communication attachments?
 - (b) Is CANDAS asking the OEB to mandate pole top antenna placement?
 - (c) Does CANDAS acknowledge the Ontario Regulation 22/04 that allows each utility to develop its own Standards?

VI. Lemay-Yates Report – July 26, 2011

67. At page 7 of the Lemay-Yates Report, "consumers" are repeatedly referenced in noting that "investment in wireless telecommunications infrastructure is an investment in the future that is beneficial to consumers and to their communities..."
- (a) Please clarify if this refers to electricity consumers, which are the focus of the OEB, or to wireless service consumers.
 - (b) If the reference is to wireless service consumers, please suggest how this may be relevant to the OEB.
68. At page 8 of the Lemay-Yates Report, the Rogers network densification program is referenced as an initiative to add further capacity in major urban centres.
- (a) Please comment on what this "network densification program" entails, and more specifically, whether it is any different than the Macro Cell splitting that wireless providers routinely undertake.
 - (b) Please indicate why, if Rogers is densifying, there is no evidence in this proceeding that Rogers is clamouring to adopt DAS or any other form of wireless apparatus on poles?
 - (c) Is Rogers deploying DAS systems to implement this network densification program or Macro Cell tower technology?
 - (d) If not, what technology is Rogers deploying in lieu of DAS systems?
69. Page 13 of the Lemay-Yates Report references the fact that Globalive Wireless, Mobilicity, Public Mobile and Videotron all secured spectrum licences to provide wireless services in Toronto and that all of these new entrants, with the exception of Videotron, have launched service in the Toronto area.

- (a) Please describe the technology that each of these new entrants are deploying in order to provide wireless service in the Toronto area.
70. Page 17 of the Lemay-Yates Report references the fact that there are six wireless carriers operating in Toronto. How many of these six carriers are providing service using outdoor DAS technology?
71. Page 19 of the Lemay-Yates Report states that denial of access to utility poles and lampposts would have a significant impact on the development of a competitive wireless market. Since electric utility poles and lamp standards are never the only infrastructure available to provide adequate service coverage, describe the “impact” that using dedicated antenna structures would have on the “development of a competitive wireless market based on current technological trends”.
72. Page 20 of the Lemay-Yates Report contends that a DAS network requires new fibre. Since the wireline infrastructure likely already exists and access to it can be obtained according to CRTC and Industry Canada rules, why must new wireline infrastructure be installed?
73. Page 20 of the Lemay-Yates Report states that “using fibre optics to provide backhaul links to central hub locations is increasingly *de reguer* to deploy future-proof networks”. Please provide a definition of “future-proof” networks in the context of an ever-changing communications world.
74. At page 21 of the Lemay-Yates Report, one of the advantages articulated of the DAS system is that DAS can provide a speedier deployment, compared to the development of large Macro Cell Sites which may take more than one year. Given that a BTS hub is the equivalent of a Macro Cell tower site without a tower, how does one get to a 9-month deployment?
75. Page 21 of the Lemay-Yates Report states that “...neutral DAS deployments, such as those contemplated by CANDAS, can be accessed by more than a single mobile carrier which provides additional significant benefits...”
- (a) Explain what is meant by “neutral DAS deployments, such as contemplated by CANDAS”.
76. At page 22 of the Lemay-Yates Report, ACT Presentation’s to the FCC was cited as stating “DAS is a targeted solution that is becoming a carrier necessity”.
- (a) This presentation addressed deployment in San Diego in 2007.
- (i) Was this San Diego deployment as large as that contemplated for Toronto?
- (ii) How much of it was on electric utility poles? How much on lamp-standards?
- (iii) What other structures were used?

- (b) Since six wireless carriers are providing service in Toronto without DAS, it would appear as if, in Canada, DAS is not a carrier necessity. When will it be, since all areas are covered today?
 - (c) Since DAS is only deployed in the City of Montreal and cannot be deployed on electric utility structures in many large centres in Canada because these structures do not exist, please provide evidence to support the contention that it is a “critical and necessary tool” for wireless carriers.
77. At page 23 of the Lemay-Yates Report, the DAS networks of AT&T, Cricket Communications, T-Mobile and Metro PCS in the U.S. are referenced. Are these DAS networks deployed exclusively using electrical utility poles (i.e. transmission or distribution lines, not streetlights)?
78. At page 26 of the Lemay-Yates Report, it states that DAScom “contemplated the deployment of 730 DAS nodes throughout the city of which approximately 90% would be on hydro poles.”
- (a) Please provide the relevant particulars in support, including all reports, analyses, studies, working papers, memoranda, correspondence, and other documents regarding the specific infrastructure (non-hydro poles or otherwise) to which the remaining 10% of DAS nodes were to be attached.
 - (b) Regarding the response to (a), please include the location and elevation of the attachments.
79. At page 27 of the Lemay-Yates Report, the deployment of DAS in Montreal is discussed.
- (a) Please provide a copy of the agreement between DAScom and the City of Montreal for the deployment of DAS on 259 lampposts.
 - (b) Please verify that the City of Montreal has deployed a DAS network without the requirement for electric utility poles.
 - (c) Please verify that the City of Montreal was not only compensated for the attachments but also received direct benefits from the DAS network.
80. At page 27 of the Lemay-Yates Report, Lemay-Yates references its analysis of Industry Canada’s spectrum direct database, which, according to Lemay-Yates, identifies approximately 300 antennae located at heights comparable with installations on utility poles. Please provide a breakdown of these 300 antennae with reference to whether they are attached to electrical utility poles or other structures. For those that are attached to other structures, please describe the type of structure (i.e. streetlight, rooftop, building).
81. Page 29 of the Lemay-Yates Report describes the characteristics of support structures that are used to deploy DAS Networks and states that “utility poles including hydro poles, lampposts and streetlights are clearly the support structure that best fulfils these requirements”.

- (a) Please clarify why DAS networks require support structures that can be found almost everywhere when only 3-7 are required per square kilometre.
 - (b) Please clarify why DAS networks require support structures that are recurrent and evenly spaced when only 3-7 are required per square kilometre.
 - (c) Please clarify why DAS networks require support structures that are of a relatively uniform height when they are installed at heights between 5 and 14 metres successfully.
 - (d) Is Lemay-Yates aware of DAS systems that have been deployed in North America or Europe via attachments to structures other than utility poles? If yes, please provide details of these installations.
82. Page 30 of the Lemay-Yates Report states that “deployment of DAS networks cannot only be done only with rooftops”. Please provide evidence to support the statement.
83. Page 31 of the Lemay-Yates Report quotes the U.S.’ FCC’s and CTIA’s statements in regards to utility poles. Please explain why this technology is described as critical and necessary for Canada when it isn’t deployed in more than one city.
84. Page 32 of the Lemay-Yates Report states that “[w]e conclude that wireless attachments to utility poles including hydro poles are necessary for the deployment of DAS networks...”
- (a) Please provide evidence to support the contention that electric utility poles are necessary when there are many alternative suitable structures for DAS antennae.
 - (b) Please comment on the use of Femtocell technology as a substitute for outdoor DAS.

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