

**Third Party Review**

**SouthWestern Integrated Fibre Technology Inc. (SWIFT)  
Business Case for South Western Ontario and Niagara Region**

July 30, 2015

Prepared for

Western Ontario Wardens' Caucus (WOWC)

&

Ministry of Economic Development, Employment and Infrastructure (MEDEI)  
Government of Ontario

By

Reza Rajabiun, LLM, PhD  
Ted Rogers School of Management, Ryerson University  
Contact: 416 833 4864; reza.rajabiun@gmail.com

For Public Release

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## **Statement of Work**

The consultant will provide a review of the SWIFT business model/case. The review will:

1. Assess business model/case scenarios based on different levels of telecom service providers' participation.
2. Assess how the SWIFT network would advance last mile deployment in each scenario.
3. Assess the viability of the business model/case in terms of how it addresses varying levels of participation of the Broader Public Service (BPS) sector, also known as the Municipalities Universities Schools Hospitals (MUSH) sector as the SWIFT business model/case is initially dependent on revenue from this sector.
4. Assess the risk and benefits of the proposed governance structure in the business case, including maintenance of an ongoing "equity position" by the SWIFT, Inc., in the fibre optic infrastructure ownership.
5. Assess the risks and benefits derived from the SWIFT governance structure and proposed "levy" or "residual" and its ability to deliver last mile fibre optic connectivity to all residents and business in Southwestern Ontario versus other potential alternative approaches.
6. Assess the similar broadband initiatives profiled in the feasibility study and other models as enumerated by SWIFT Steering Committee from across the country the consultants may have knowledge of and compare and contrast lessons learned with the recommended SWIFT governance and deployment model.
7. Assess the business model/case for how SWIFT will incorporate and/or complement existing broadband infrastructure and respond to potential market competition from non-participating telecom service providers.
8. Assess the marketing outreach and engagement plan to ensure that the SWIFT proposal has sufficient support from telecom service providers, public sector entities, and other potential users.
9. Assess the impact of the OPS/MGS procurement for GONet on the SWIFT model and how these projects may best complement each other.
10. Assess the pros and cons of delivering the SWIFT project through Infrastructure Ontario's Alternative Financing and Procurement model (P3 model).

## **Methodology**

The consultant will have ample scope to engage in the review and comment on any other areas deemed significant for such a development but not listed above, so that the best possible advice can be provided. The assessment will draw on the consultant's knowledge of business models/cases for broadband development plus offer insights on the feasibility of the proposed approach based on the documentation provided, interrogatories with SWIFT committee staff/consultants and other appropriate material.

## **Executive Summary**

1. **Objective and scope of this review:** The Western Ontario Warden’s Caucus (WOWC) has identified improving the Regions’ broadband Internet access infrastructure as a strategic economic development priority. To achieve this objective, the WOWC has evaluated the current state of the network in Western Ontario and consulted with public and private sector user communities to understand their demands. Given the extent of coverage and capacity gaps in access to high-speed connectivity and to promote private sector incentives to deploy next generation fixed fibre and 4G LTE mobile infrastructure, the WOWC has developed the SouthWestern Integrated Fibre Technology Inc. (SWIFT) business model/case. This report provides an independent assessment of the SWIFT business model/case, as specified in the Statement of Work noted above. The Statement of Work provides this reviewer with “ample scope to engage in the review and comment on any other areas deemed significant..., so that the best possible advice can be provided”. The objective of the review is to provide the best possible advice to the WOWC, the Ministry of Economic Development, Employment and Infrastructure (MEDEI), and other potential stakeholders.
2. **Data:** The primary source of technical and financial data used in this review is presented in the SWIFT Business Case for South Western Ontario and the Niagara Region (version June, 2015). To provide a thorough evaluation of the SWIFT business case this reviewer has further consulted a variety of background documents such as the SWIFT Feasibility Study, marketing and stakeholder engagement plans, and interrogated financial estimates underlying the SWIFT plan developed for WOWC by BDO Canada LLP. BDO has validated underlying accounting estimates and organizational arrangements for the governance of SWIFT. It has also developed a detailed baseline financial plan for SWIFT and determined that “project risks have been properly analyzed and considered”. This reviewer is satisfied with responses to requests for further information and clarifications from SWIFT and BDO.
3. **Methodology:** Based on the estimates provided by BDO this review develops a long term financial model to evaluate the sensitivity of the SWIFT business case/model with respect to specific areas outlined in the Statement of Work. Furthermore, the review considers other potentially relevant factors and contingencies, analyzes the relevance of the SWIFT business model/case in the context of broader trends in broadband network development, and lessons learned from rural broadband infrastructure development projects in other parts of Ontario and Canada. Other key strategic issues that are likely to have an impact on the success of the project, including procurement, implementation, and operational risks are analyzed in order to provide the best possible advice to policymakers.

## **Findings**

4. **Key assumptions:** There are two key economic assumptions about demand and supply conditions in the Western Ontario and how they are likely to evolve in the medium to long term that motivate SWIFT. The SWIFT business model/case assumes that demand for fixed and mobile broadband network resources is likely to continue its rapid growth in

the next few years. This demand side assumption is consistent with recent trends in Canada and internationally, as well as projections by industry about rapidly growing demand for advanced fixed and mobile broadband networks. Furthermore, the WOWC SWIFT plan assumes that the business case for private operators to make the investments in new technologies and capacity upgrades needed to meet growing Regional demand is likely to remain limited. Given national trends and Regional evidence on the current state of the network and costs of upgrading it to standards WOWC has specified, the two key demand and supply assumptions motivating SWIFT appear realistic and reasonable. Without innovative public policies, the private sector business case to address coverage and capacity gaps in the Regional network infrastructure is likely to remain weak.

5. SWIFT design strategy: A variety of approaches have been adopted in Canada and around the world to address market failures in the provision of broadband transport and access facilities in areas where the business case for private sector investment is weak (or nonexistent). The SWIFT design strategy appears to have been guided by successes and failures of the diverse range of rural and regional broadband development initiatives deployed across the country over the past decade to stimulate private sector provision of Internet access services. Specifically, SWIFT recognizes that both transport and access facilities in relatively higher costs areas can be prone to under-investment and plans to target strategic public subsidies in a balanced manner into both essential components of the broadband infrastructure in the Region. In broad terms, this design strategy is similar to the Eastern Ontario Regional Network (EORN). While avoiding direct competition with the private sector as in EORN, the SWIFT approach plans to charge an economic development “levy” on services delivered on the open access Regional network in order to fund fibre-to-the-premises (FTTP) access network deployments in high cost areas of Western Ontario. Although it is difficult to predict if the SWIFT last mile fibre funding model will lead to 100% fibre diffusion by 2040, SWIFT is likely to substantially increase the pace of progress in the transition from legacy to next generation broadband networks in Western Ontario. In the opinion of this reviewer, the combination of targeted transport and access network subsidies are well designed to increase the pace of progress in network development by reducing the costs of network deployments and increasing private sector incentives to invest in the Regions’ broadband infrastructure.
6. Fixed/mobile convergence: The SWIFT design strategy recognizes the rapid growth in demand for mobile data services and that gaps in the Region’s advanced mobile infrastructure (4G LTE) remain pervasive outside of urban centres and major highways. Closing coverage and capacity gaps in the Regional mobile infrastructure requires extensions (to improve coverage) and upgrades (from legacy ATM/SONET standards to Metro Ethernet) in the fibre footprint in relatively less densely populated areas of the Region. In addition to providing the basis for promoting investments in fixed networks, SWIFT is designed to serve as a platform that mobile operators can share to provide their customers advanced data services across the Region. Closing mobile network coverage and capacity gaps in rural areas are a growing concern not just in Western Ontario, as illustrated in ongoing efforts by the Eastern Ontario Warden’s Caucus (EOWC)/Eastern Ontario Regional Network (EORN). Accounting for both fixed and mobile gaps in Western Ontario enhances the overall value for public investment in SWIFT relative to

earlier programs across Canada that focused primarily on enhancing fixed broadband access speeds.

7. Sensitivity to service provider participation: The SWIFT business model/case has been designed and cost estimates have been developed based on a “greenfield” engineering model of what it will take to deploy a network to coverage and capacity standards specified by WOWC. This represents a conservative approach to modeling the project and should be viewed as a worse case scenario in which larger incumbent operators choose not to participate in SWIFT (i.e. non-cooperative outcome). In the best case “cooperative” scenario, private participation by one or more of the larger service providers will reduce deployment costs and increase projected long term traffic/revenues on SWIFT relative to the baseline model. Once SWIFT becomes operational, it is designed to generate a sustainable source of funds for FTTP access network subsidies in relatively high cost areas where operators have had limited incentives to invest and public inducements appear necessary. Although a group of smaller incumbent service providers strongly objects to SWIFT,<sup>1</sup> this group accounts for less than 5% of residential subscribers in Western Ontario. Most of the larger telecom service providers whose participation in SWIFT will reduce deployment costs and attract traffic from residential and business retail markets have expressed their support for WOWC’s SWIFT initiative. While the SWIFT business model/case is not sensitive to participation by smaller legacy network operators, in the opinion of this reviewer it is important to ensure they can access the Regional network once it has been deployed and have an opportunity to compete for last mile access subsidies during the operational stage of project.
8. Sensitivity to Broader Public Service (BPS)/MUSH sector participation: In terms of overall demand generation, the BPS/MUSH sector is a substantially smaller source of revenues/traffic than residential and business users. Consequently, in the longer term the SWIFT business model/case is not sensitive to their participation as buyers of services/capacity. Cooperation by BPS/MUSH sector entities where SWIFT intends to situate its local Points of Presence (POP) facilities will help reduce SWIFT deployment and operational costs. The SWIFT business model/case accounts for the possibility that some large BPS/MUSH sector entities may not be able to (for example because they are locked into long term contracts) or choose not to use SWIFT. By working with service providers, rather than targeting end users directly, SWIFT can reduce the perception that it plans to compete with incumbent service providers. This can increase the likelihood that more service providers participate in the project with their own investments and channel more end user traffic to the more advanced Metro Ethernet middle mile/transport facilities SWIFT will offer.
9. Opinion: Based on evidence provided by the SWIFT business/model, and supporting documentation, this review has analyzed its sensitivity to a wide variety of factors and

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<sup>1</sup> Specifically, Independent Telecommunications Providers Association (ITPA) member companies in Western Ontario. In July 2014 ITPA submitted an alternative plan to WOWC that aims to deploy fibre to the node and home connections in high cost areas in which they currently offer DSL coverage. This consultant has been requested to also provide an independent review of the ITPA proposal, which should be available mid August, 2015.

considerations outline in the Statement of Work. Although the “worse case” scenario is always a possibility, the sensitivity analysis provided here suggests that even if SWIFT is only moderately successful it will generate around \$100 mil. in residual income to subsidize last mile FTTP deployments in relatively high cost communities across the Region. In the best case cooperative solution, SWIFT can generate five times this amount over its 20 year operational stage. Reality is likely to lie somewhere in the middle of the two extreme scenarios. The level of the SWIFT residual may not be sufficient to reach 100% FTTP penetration by 2040. However, the Region would be substantially further along the long term transition from legacy DSL and cable to next generation FTTP and 4G LTE mobile platforms if it adopts SWIFT than if it does not. The risk to the WOWC/SWIFT Inc. equity position seems limited, while it will be critical for ensuring the Regional network remains open to all service providers and generates the economic development residual required for last mile subsidies to promote connectivity in higher cost areas of the South Western Ontario. Subject to various strategic considerations and inherent uncertainties detailed in this document, this reviewer finds that SWIFT offers an innovative, realistic and strong business model for ensuring that Western Ontario can catch up, and potentially surpass, urban Canada in broadband infrastructure quality and affordability. It is in the opinion of this reviewer that SWIFT should be funded as a traditional infrastructure improvement initiative.

## 1. Overview of the SWIFT business model/case

10. Background: The SWIFT business model/case builds on a set of previous surveys, consultations, and engineering studies of the current state of the Regional broadband infrastructure, which are summarized in the SWIFT Feasibility Study. Systematic evidence presented in the Feasibility Study documents significant gaps in the quality of broadband services in terms of Internet connectivity speeds, particularly in less densely populated suburban and rural areas of Region. In fact standards of service quality in many parts of the Region fall below the current 5 Mbps broadband speed minimum threshold targets set by the Canadian Radio-television and Telecommunications Commission (CRTC).<sup>2</sup> The relatively low service quality end users in the Region can achieve suggests that the rate of investment by telecom service providers in capacity upgrades and advanced broadband technologies is not sufficient to meet growing demand for Internet access services in Western Ontario.<sup>3</sup> Information provided by the service providers and a detailed mapping of gaps in the Regions' fixed and mobile infrastructure facilities presented in the Feasibility Study further identify areas of the network that are prone to under-investment and require upgrades.<sup>4</sup> The SWIFT business case/model presents a specific technical and economic framework for addressing the market failures that have been identified with a combination of targeted public subsidies and infrastructure sharing incentives intended to promote private sector investments in the Regions' broadband infrastructure.
  
11. Previous findings: An independent review of the SWIFT Feasibility Study found it made "a strong case for the value of open access broadband infrastructure, designed to scale to meet the ever growing bandwidth demands across the region and to foster competition among service providers by providing access to all on equal terms. This model of broadband as an integrated infrastructure designed to serve multiple providers, rather than patchwork internet services operating on multiple technological platforms, is one that is widely and successfully adopted around the world."<sup>5</sup> The previous review also found evidence on the lack of investment in the so called "middle-mile" and transport facilities in the Region, and therefore recognized that upgrading it to Metro Ethernet Standards will be a necessary condition for enabling residents, businesses, and the Broader Public Service (BPS)/Municipalities, Universities, Schools, and Hospitals (MUSH) sectors to deploy advanced Internet applications that require relatively faster and increasingly

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<sup>2</sup> The current speed targets and the design of funding mechanisms needed to increase the quality of broadband services in under-served rural and remote communities are presently the subject of a review at the CRTC. See: Telecom Notice of Consultation, CRTC 2015-134. Available at: <http://www.crtc.gc.ca/eng/archive/2015/2015-134.htm>

<sup>3</sup> For an overview of the implications of the federal regulatory debate from the perspective of Ontario and further evidence documenting concerns about the quality of Internet connectivity in the province see submission by the Ministry of Economic Development, Employment, and Infrastructure (MEDEI) to the above noted CRTC 2015-134 Notice of Hearing. Available at: <https://services.crtc.gc.ca/pub/DocWebBroker/OpenDocument.aspx?DMID=2394405>

<sup>4</sup> For a detailed discussion of broadly similar issues in Eastern Ontario and relevant data see submission by the Eastern Ontario Wardens' Caucus (EOWC)/Eastern Ontario Regional Network (EORN) to the CRTC 2015-134 "basic services" proceeding noted above. Available at: <https://services.crtc.gc.ca/pub/DocWebBroker/OpenDocument.aspx?DMID=2393336>

<sup>5</sup> Report prepared for WOWC by Professor Catherine Middleton, June 2014. p. 13.

symmetric connectivity speeds with available quality of service (QoS) guarantees. Consequently, there is little question about the immediate need for extending and upgrading the middle mile and transport facilities in the Region to technical standards specified by WOWC for SWIFT. In the very long term, a transition from legacy copper/DSL and cable last mile links to next generation fibre-to-the-premises (FTTP), 4G mobile, and hybrid fibre/mobile network will also be required to ensure access to advanced broadband infrastructure in Western Ontario.<sup>6</sup>

12. SWIFT business model/case development: While recognizing the importance of technical upgrades and capacity enhancements SWIFT Feasibility Study proposed, the previous review indicated the plan needed further development particularly in terms of:

- A more detailed understanding of projected market demand and expected revenues once the Regional network is operational.
- Incorporating a strategy that uses value generated by improvements in middle-mile and transport infrastructure to improve the quality of “last mile” links that connect end users premises to the Regional network.
- Implementing governance and marketing strategy that ensures the diversity of demands by stakeholders are incorporated into the design of the project.

In developing the SWIFT business model/plan reviewed in this report, the WOWC has invested significant resources in addressing these recommendations. Specifically, WOWC has enlisted the help of municipal and infrastructure advisory team at BDO Canada LLP to develop detailed revenue and operational cost estimates required for assessing the viability and sustainability of SWIFT in the 20 to 30 year period after it has been funded and initiated. Accounting/Advisory team at BDO have also validated the underlying engineering cost estimates and helped design a governance model that aims to enable SWIFT to generate a sustainable source of investments into last mile FTTP networks by 2040. The SWIFT team has further developed detailed stakeholder engagement and marketing plans to support its plan and ensure its viability. It is important to note that only the summary of the underlying data used in this review is presented in the SWIFT Business Case for South Western Ontario and the Niagara Region (version June, 2015).

13. SWIFT business model/case review: In addition to assessing specific aspects of the SWIFT project as detailed in the statement of the work, this review evaluates how well the SWIFT business model/case has answered the recommendations raised in the 2014 review of the SWIFT Feasibility Study. To provide the best advice regarding funding and the implementation of the project, this review develops a baseline financial model of

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<sup>6</sup> Depending on population density, geography, and other factors, extending fibre links to a small number of very high cost end users in rural and remote communities may not be economically efficient as hybrid fibre/wireless last mile/access network technologies have evolved to meet the specific needs of such communities. For a discussion of the interplay between fibre and mobile physical infrastructure see: For an analysis of the interplay between fixed and wireless networks see: Kolydakis, N.; Tomkos, I. (2014) "A techno-economic evaluation of different strategies for front-/back-hauling of mobile traffic: Wireless versus fiber based solutions," *16<sup>th</sup> International Conference on Transparent Optical Networks (ICTON)*. doi: 10.1109/ICTON.2014.6876350

the project using cash flow estimates provided by SWIFT and BDO staff. This baseline model is then employed to evaluate the capacity of the proposed SWIFT business plan to achieve the objectives for the project specified by the WOWC and to assess the sensitivity of the SWIFT model to the variety of risk factors and contingencies detailed in the Statement of Work.

14. Completeness: The high level of detail in the SWIFT Business Case for South Western Ontario and the Niagara Region, as well supporting documentation provided to this author, indicate that questions and recommendations outlined in the earlier review of the SWIFT Feasibility Study have been thoroughly considered. In particular, the BDO infrastructure advisory team has helped fashion the technical plan for addressing coverage gaps and upgrading the Regions' backbone infrastructure into an operational model designed to promote long term private sector investments in FTTP access networks. The combination of targeted subsidies to extend and upgrade transport facilities and the mechanism for funding FTTP deployments suggest the SWIFT model/case has carefully considered concerns about the effectiveness of earlier rural broadband programs that have tried to promote infrastructure investments in either transport/middle mile or access/last mile network facilities.<sup>7</sup>
15. Key source of uncertainty: It is important to note that how financial projections analyzed in this report are actually realized in the future will depend to some degree on the level of participation by larger telecom service providers, offers they make in terms of additional investments in SWIFT, and which combinations of private partners are selected to deploy and operate SWIFT through the proposed Request for Qualification (RFQ) and Request for Proposal (RFP) processes. Although a coalition of smaller service providers (ITPA) currently opposes SWIFT, responses by larger facilities operators and letters of support a number of them have provided for the SWIFT model indicate substantive service provider interest in the project. This is not surprising given the nearly \$200 mil. of public subsidies that SWIFT plans to allocate to extensions, middle mile and transport facilities are expected to generate nearly \$1 bil. in additional revenues over the next 20 years for operators that choose to participate in SWIFT. Given that SWIFT is expected to produce an additional \$200 to \$300 mil. from its economic development levy and allocate these funds to promote FTTP deployments in high cost areas, the apparent position of smaller DSL/copper network operators in high cost areas of the Region is puzzling to this reviewer. This position might change once SWIFT is funded and deployed as it will make substantial subsidies available to operators and communities that choose to accelerate local FTTP deployments. The design of the proposed RFQ and RFP processes, as well as contractual mechanisms that specifies commitments in the public private partnerships for the operation of SWIFT, are therefore likely to be critical to maximizing long term value public investments in the project will generate for the Region.

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<sup>7</sup>For an analysis of rural program design strategies that have helped extend access to 1<sup>st</sup> generation broadband see: Rajabiun, R., & Middleton, C. (2013). Rural Broadband Development in Canada's Provinces: An Overview of Policy Approaches. *The Journal of Rural and Community Development*, 8(2), 7-22. <http://www.jrcd.ca/viewarticle.php?id=1140>

## 1.1. SWIFT objectives and strategies

16. Public mandate: High level objectives and strategies for the SWIFT project have been designed and approved by WOWC. The main objective WOWC is trying to achieve with SWIFT is to promote regional economic development by improving the broadband infrastructure that is available to residents, businesses, BPS/MUSH, and other user groups. Given the extent of gaps in access and service quality available in the Region and detailed in the SWIFT Feasibility Study, the WOWC have identified funding SWIFT as a strategic economic development priority.<sup>8</sup> The SWIFT mandate from WOWC is to deploy a “ubiquitous, affordable and accessible regional ultra-high speed broadband network regardless of population density”. The WOWC has further adopted a set of seven guiding principles to frame the design and implementation of SWIFT in order to ensure the project succeeds in serving the public interest in improving the Region’s broadband infrastructure.<sup>9</sup> These guiding principles are consistent with international standards in the design and governance of infrastructure sharing arrangements for deploying advanced services that enable multiple operators to share the fixed costs of new technologies while promoting market competition in the provision Internet access and over-the-top (OTT) services.<sup>10</sup>
17. SWIFT design strategy: The SWIFT business model/case has been designed to extend fibre connectivity to public institutions, businesses, and households across the entire Western Ontario and Niagara Region by 2040. The long term plan for achieving this objective can be viewed as a two step process.
18. Regional network deployment stage (2015-2020): As a first step, by 2020 SWIFT plans to enhance private sector incentives to upgrade fibre transport facilities, where they are already available and to bring “fibre optic Points of Presence (POP) to every county, city, town, village and hamlet in the region to population bases as low as 4-persons per square kilometre.”<sup>11</sup> This design strategy is consistent with the ubiquity mandate set out by WOWC. A significant portion of the initial costs of SWIFT will be allocated to extending high capacity fibre links to communities that currently do not have such access or rely on legacy technologies. In order to minimize the overall costs of the project and the potential for inefficient duplication, SWIFT plans to partner with network facilities provider that have already invested in such facilities using a set of long term Indefeasible Right of Use (IRU) agreements. While there remains some uncertainty about the willingness of some of the larger operators in the Region to offer WOWC SWIFT access to fibre facilities they may have already installed, the SWIFT business model provides them with attractive returns for contributing their unused capacity to the proposed Regional network. Reasonably priced third party access to transport facilities represents a key problem for extending fibre and hybrid fibre/wireless networks in relatively higher costs areas. The

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<sup>8</sup> <http://www.wowc.ca/>

<sup>9</sup> See page 13-14 of the SWIFT business case for an overview.

<sup>10</sup> Over-the-top (OTT) is a generic term used for communications services and applications that are delivered to end users on the Internet with minimal interference by the operators of the physical network infrastructure carrying the data (e.g. voice, video, peer-to-peer, cloud computing, Internet of Things, etc.).

<sup>11</sup> SWIFT business case, p. 7.

fact that letters from some of the larger transport network operators in the Region, indicate that transport links connecting many communities continue to rely on legacy standards (e.g. SONET, ATM) and require significant upgrades to more advanced and economical open Metro Ethernet standards lends further support to the deployment model underlying the SWIFT business plan. The motivation in the design of SWIFT to first upgrade the Regions' transport and middle mile facilities that aggregate traffic from local communities to Metro Ethernet standards reflects the guiding principles set out by WOWC for SWIFT to rely on a standards-based architecture that is highly available, scalable, neutral, and ubiquitous across the Region.

19. Operational/FTTP deployments stage (2020-2040): Once upgrades and capacity enhancement to transport facilities have been implemented by 2020, as a second step SWIFT intends to retain a small portion of revenues generated by the advanced services that it will enable as an economic development “levy” or “residual”.<sup>12</sup> The objective of this fee is to provide a sustainable funding basis for extending next generation FTTP networks to businesses and households throughout Western Ontario and the Niagara Region. This design strategy in SWIFT represents an innovative solution to increasing the pace of progress in terms of FTTP diffusion to businesses and households. With this approach SWIFT plans to retain part of the economic value generated by extending and upgrading the Regional middle mile and transport facilities to increase the long term pace of progress in the transition from legacy copper/DSL, cable, and 3G mobile platforms to FTTP and 4G+ last mile links required for delivering high symmetric speeds with minimum service quality guarantees. This solution suggests that SWIFT has taken recommendations in the independent review of the Feasibility Study about the need to have a plan to increase access to next generation FTTP networks seriously. The capacity of SWIFT to achieve 100% FTTP diffusion in the Region by 2040 will depend on a number of factors detailed in the subsequent sections of this review.
20. Public investment/duplication minimization: At the deployment stage, SWIFT plans to minimize capital expenditures and minimize the potential for duplication (i.e. facilities “overbuild”) by entering into long term contracts with entities who have already deployed some fibre assets across the Region and are willing to enter into IRU agreements with SWIFT. This is expected to save between \$50 to \$70 mil. out of a total of about \$290 mil. in initial deployment costs associated with extending and upgrading the Regional middle mile/backhaul infrastructure to standards specified by WOWC. However, in order to limit the potential for future competition some incumbents may not be willing to cooperate with WOWC in deploying an open access network. The SWIFT business plan takes the minimum of the estimated range of potential private sector contributions to the initial build to develop its cost estimates. In terms of the FTTP deployment phase, open bidding processes that follow SWIFT guiding principles provide the opportunity for maximizing private sector investments required for the transition from legacy to next generation broadband networks. By deploying middle mile/transport infrastructure that

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<sup>12</sup> In the business plan it states that the economic development fee on wholesale services will be below 5%. The baseline business model of SWIFT developed by BDO assumes this rate to be 3.5%. Given the long term nature of the proposed project, in practice it might be more efficient to leave some discretion to SWIFT Inc. to adjust this rate in response to market conditions as the project evolves.

enables service quality guarantees end users and advanced Internet applications increasingly require, reducing its costs, and maintaining transparent neutrality standards, SWIFT aims to enhance both competition and investment incentives in the Region.

21. Operational expenditure minimization: As estimated by SWIFT and verified by BDO, operational costs of SWIFT will decline to around 10% of expected revenues from the economic development charge placed on the provision of services on the Regional network (at 3.5% of total market revenues) after the first decade of the project. The low ratio of operational expenditures to revenues aims to ensure that SWIFT is sustainable from an accounting perspective and will not require further public funding after the initial allocation. By allocating most of the operational costs to private partners that will manage particular components of the Regional network, the SWIFT design strategy tries to maximize the funds that will be leveraged to increase last mile FTTP access in relatively higher cost areas of the Region. With this cost minimization strategy, SWIFT is expected to generate between \$200 to \$300 mil. in additional public funds for last mile FTTP deployments once it is operational. BDO estimates that extensions and upgrades to the middle mile/transport infrastructure will further increase Regional service provider revenues by around \$800 mil. over the 20 year operational phase of SWIFT, some of which they may choose to reinvest in SWIFT. Obviously WOWC would have little control over decisions by operators about these private gains from the infrastructure improvement project. Consequently, the economic development levy on the Regional network will be critical to the capacity of SWIFT to ensure that all residents and business have access to fibre last mile connections by 2040.
22. Public-private risk allocation: The SWIFT business plan provides the basis for a set of public and private contractual arrangements that provide private partners with the opportunity for attractive returns, if they choose to participate. These partners will be responsible for operational aspects of the Regional network and planned FTTP deployments, and therefore will be in the best position to account for and avoid material operational risks. Given rapidly growing demand by users for network resources and sustained Internet connectivity speeds, emphasis of the SWIFT business plan on scalability and service quality guarantees expected from private partners is appropriate. Nevertheless, SWIFT's private partners will have some economic incentives to accept public funding and then to minimize their own risks/contributions. Consequently, it is the opinion of this reviewer that design of contractual mechanisms between SWIFT and private partners will be critical to the success of the project and should be monitored closely by WOWC and other potential funders. Sustainability of the project and its capacity to achieve its objectives will depend on the manner in which these arrangements will allocate risks and returns between WOWC and service providers selected to help improve the Regions' broadband infrastructure. The plan by WOWC to maintain some measure of high level strategic control through its equity in SWIFT Inc. is similarly important as a form of insurance against long term risk to the public sector. The SWIFT business plan does not include any form of debt financing on the part of the public sector, which limits the potential for any risks from maintaining a long term equity position by the public sector in the project.

## 1.2. Context: Underinvestment in the transition to next generation broadband networks

23. Canadian context: Canada was one of the first countries to adopt a regulatory framework for enabling competition on copper telephone networks in the 1990s. However, since the early 2000s the federal policy framework has tried to promote facilities based investments by forbearing from imposing any unbundling and wholesale access obligations on fibre access and transport facilities.<sup>13</sup> This strategy has been relatively successful in achieving its objective as aggregate telecom capital expenditures in Canada have been consistently higher than average for other high income countries. This has led to substantive upgrades to legacy copper/DSL and cable broadband networks, which are now available to more than 90% households/premises in the country.<sup>14</sup> Various targeted subsidy programs have also been adopted by federal, provincial, and municipal governments to extend coverage to Canadians that live and work on the higher cost rural edges of the network prone to under-investment and market failures. Despite this apparent success in terms of coverage, concerns about Canada's comparative decline as a broadband leader have become increasingly pronounced.<sup>15</sup> Specifically, the Canadian broadband development experience in the past decade is puzzling because relatively high telecom investment levels have not lead to the development of very high quality network (in terms of average download/upload speeds).<sup>16</sup> Furthermore, it is evident that the CRTC forbearance from regulating third party access/interconnection obligation to fibre facilities has not been an effective regulatory strategy for promoting FTTP diffusion, even in urban and suburban areas of the country.<sup>17</sup>
24. FTTP diffusion path: Given the substantially higher service quality that fibre optic broadband platforms can offer (as well as lower operational costs), in the very long run they are likely to replace legacy copper/DSL and cable networks. However, legacy last mile platforms generate substantive free cash flows to their operators and can limit some

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<sup>13</sup> Telecom Decision CRTC 2008-17; Available at: <http://www.crtc.gc.ca/eng/archive/2008/dt2008-17.htm>

<sup>14</sup> The exceptions are relatively remote end users and communities who have to rely on fixed wireless and satellite broadband platforms. CRTC Communications Monitoring Report, 2014. Available at: <http://www.crtc.gc.ca/eng/publications/reports/PolicyMonitoring/2014/cmr.htm>

<sup>15</sup> In 2006 the Telecommunications Policy Review Panel (TPRP) provided federal policymakers with early warnings about Canada's comparative decline as a broadband leader and its particular implications for meeting the needs of Canadians that live in relatively higher cost rural areas. Available at: [https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/tprp-final-report-2006.pdf/\\$FILE/tprp-final-report-2006.pdf](https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/tprp-final-report-2006.pdf/$FILE/tprp-final-report-2006.pdf)

<sup>16</sup> Rajabiun, R., & Middleton, C. A. (2013). Multilevel governance and broadband infrastructure development: Evidence from Canada. *Telecommunications Policy*, 37(9), 702-714. <http://www.sciencedirect.com/science/article/pii/S0308596113000724>

<sup>17</sup> In its decision following a two year review of the problem, issued 22 July 2015 the CRTC reversed its position on third party access/interconnection obligations on last mile FTTP network, hoping to simulate more investments and limit the potential for duplication in the development of such networks in the future. The CRTC refused to extend third party access obligations to transport facilities and dark fibre, an issue of particular importance for the ability of rural communities across the country to improve their own broadband infrastructure by building high quality last mile FTTP and hybrid fibre/mobile broadband networks. See Telecom Regulatory Policy Decision CRTC 2015-326. Available at: <http://www.crtc.gc.ca/eng/archive/2015/2015-326.htm>

incumbents' incentives to incur fixed capital expenditures required to deploy new platform technologies such as FTTP. This has been particularly the case in Canada relative to many other high income countries. According to latest available data from OECD, the percentage of fibre connections in Canada was just below 4% as of 2014, which is around 4 times lower than the OECD average (17%) and half of the U.S. (9%).<sup>18</sup> Without public policies that reduce the costs and stimulate private sector incentives to deploy FTTP networks, recent trends suggests Canada as a whole is likely to reach current OECD average fibre diffusion levels sometimes around 2030. In Western Ontario the rate of transition is likely to be below the national average, partly due to the existing gaps documented in the SWIFT feasibility study and more generally because of the relatively rural/higher cost nature of the Region.

25. Federal constraints on local solutions: Canadian constitutional arrangements allocate telecommunications regulatory authority to the federal government. However, responsibility for delivering social and business infrastructure that promotes economic development lies mostly with the provinces and lower levels of government. While this federalist arrangement provides some flexibility and scope for local experimentation with policy solutions that meet local needs and conditions, the federal policy framework restricts the set of options and strategies available to provinces and lower levels of government trying to improve broadband networks in their communities. For example, barriers to international competition tend to limit the range of potential bidders for public procurement processes, enabling local incumbents to exact a higher margin from the public funds allocated to network improvements. Probably the most important of the federal regulations in Canada that limit the scope for local solutions are those relating to wholesale Internet access and third party interconnection obligations to essential local switching and transport facilities. The lack of interconnection obligations on transport facilities represents a particular challenge for relatively higher cost rural and suburban areas. In relatively densely populated urban centres, the fixed costs of deploying new technologies and capacity upgrades can be allocated across a large number of end user. This makes it economically feasible for multiple facilities based providers to emerge and operate on a sustainable basis. However, in higher cost areas the business case for even one operator to take the lead and invest in high capacity transport and reliable last mile connectivity can be limited. Facilities based competition is therefore not necessarily feasible, nor desirable from an economic perspective as it could lead to too much duplication in fixed network assets (i.e. overbuild). As a result, federal policies intended to promote facilities based competition in urban centres are not necessarily appropriate for relatively higher cost areas.
26. The urban/rural digital divide: More than 80% of Canadians live in relatively lower cost urban areas where the costs of deploying next generation FTTP networks can be spread

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<sup>18</sup> See <http://www.oecd.org/sti/broadband/oecdbroadbandportal.htm>

Please note that many offerings in the Canadian market with marketing names such as “Fibe” or “Optik” are not FTTP deployments, but only a hybrid fibre-to-the-node (FTTN) with a legacy DSL/cable last mile connection. While marketed as if they offer blazing fast speeds, actual service quality/speeds these products often fall well short of the best effort (xMbps) rates specified in retail contracts. This is particularly the case when most end users want to deploy network intensive applications (late afternoons, evenings).

across a larger number of end users. Given that the national FTTP diffusion rate is around 4%, the problem SWIFT is trying to address is not unique to rural Canada. Even in Canada's urban centres, access to high capacity fibre links to backhaul traffic from local communities remains problematic due to the absence of a federal regulatory mandate for essential facilities operators to open their networks to third parties (e.g. apartment buildings, new housing development). In terms of service quality/speeds end users are able to receive (versus advertised "up to xMbps" rates), the problem is a general one as average upload and download connectivity speeds in Canada are substantially below those of the leading set of countries who are further along in the transition to next generation fibre networks (2 to 3 times in lower terms of download and 5-7 times lower in terms of upload).<sup>19</sup> This gap between what Canadian end users are able to achieve and what is technologically feasible (as suggested by the experience in many other countries), is closely related to disincentives of incumbents in the Canadian market to decommission their legacy last mile platforms and deploy FTTP. The problem is compounded in rural Canada, where the business case to upgrade transport facilities and invest in capacity upgrades is relatively weak (or nonexistent). The SWIFT Feasibility Study clearly validates this, documenting that in a many communities actual connectivity speeds tend to be below the minimum targets as defined by the CRTC.<sup>20</sup>

27. Rural middle mile/transport facilities: The lack of access to high capacity transport facilities represents an important challenge for relatively higher cost rural and remote communities. In these communities the business case for incurring the fixed costs of coverage extensions and technological upgrades to data aggregation and transport facilities can be weak (or non-existent). Since the late 1990s Canadian policymakers have recognized this problem, motivating the National Broadband Task Force (NBTF) in 2001 to recommend deploying an open access national transport network to address market failures in broadband infrastructure development outside Canada's urban centres and meet public sector demand for high-speed connectivity.<sup>21</sup> This recommendation from NBTF, as well as its proposal for symmetric connectivity speed targets to define broadband,<sup>22</sup> generated significant political resistance from incumbent telecom operators and was never adopted by the federal government. As in the national proposal from the early 2000s, the WOWC have adopted "openness" and "neutrality" in the SWIFT design.
28. Political risk: The history of NBTF recommendations and Canadian telecom industry over the past decades suggests design features of the SWIFT project, particularly its neutrality, open access, and service quality guarantee principles, will likely generate substantial resistance from some operators of legacy platforms. The SWIFT business

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<sup>19</sup> See <http://www.netindex.com/>

<sup>20</sup> As specified in Telecommunications Regulatory Policy 2011-291. Current CRTC targets fall well short of those adopted in many other high income countries and are under review as part of the CRTC 2015-134 consultation process. Please note that the particular broadband measurement test used in the SWIFT study (Speedtest/Ookla Net Index) tends to significantly overestimate average speeds relative to other broadband performance testing platforms such as Akamai or M-Lab NDT. Consequently, if anything, the SWIFT Feasibility Study under-estimates the extent of the Regional problem SWIFT is intended to mitigate.

<sup>21</sup> Available at: <http://publications.gc.ca/collections/Collection/C2-574-2001E.pdf>

<sup>22</sup> 1.5 Mbps down and upload speeds. Please note the 2001 recommendation of the NBTF regarding upload speeds remains higher than the current CRTC basis service target of 1 Mbps.

model tries to ameliorate this resistance by offering all potential service providers to benefit from substantial subsidies for upgrading the Regions' transport facilities and deploying next generation FTTP networks. Emphasis on Indefeasible Right of Use (IRU) agreements to minimize the SWIFT deployment costs provides an additional opportunity for entities that have already deployed fibre facilities to monetize their excess capacity. These inducements will minimize political resistance to the project by entities that may have a lot to lose from the adoption of new technologies and increased competition associated with SWIFT. Despite the fact that insisting on openness to third party interconnection and neutrality may induce some potential private partners to resist SWIFT or require a higher return for their contributions to the project, it is in the opinion of this reviewer that these design features will be critical to long term success of the project as a platform for enabling Western Ontario to catch up with, and potentially surpass, the rest of Canada in terms of broadband infrastructure quality. Short term cost reductions and private sector participation in SWIFT should be viewed in terms of long term benefits from lower wholesale costs and increased competition that can come from committing to guiding principles WOWC has mandated for the SWIFT design and implementation strategy.<sup>23</sup>

29. Regional policy innovation: Given the national trends noted above, the SWIFT business model/case represents an innovative local solution to the broader national problem. In terms of previous programs adopted in Ontario to promote broadband access and infrastructure quality in rural communities, SWIFT is broadly designed in a manner similar to the Eastern Ontario Regional Network (EORN). SWIFT also employs strategic subsidies to enhance extensions and upgrades to transport facilities, combining them with additional inducements for operators to deploy last mile fibre networks. The SWIFT model is different, and therefore innovative, by accounting for the long term growth in demand, symmetric connectivity, and service quality guarantees that are increasingly required for deploying more advanced Internet applications (i.e. from email and web browsing to multimedia, cloud computing, e-health, precision agriculture, Internet of Things). By retaining a portion of expected economic gains from extending and upgrading the Region's backbone to Metro Ethernet standards, SWIFT offers a long term Regional strategy for funding last mile FTTP deployments in under-served areas. Without upgrades to the Regions' backbone infrastructure and access to affordable high-capacity links that connect local communities to the Internet, they will continue to face infrastructure bottleneck that limits their ability to deploy more advanced Internet applications. SWIFT represents a potentially integral aspect of a variety of other efforts across the Region to use information technology as an instrument to enhance productivity and promote long term economic development. For example, the success of efforts by the Southwest Economic Alliance (SWEA) to build an "intelligent" region will depend on the availability of scalable and neutral networks capable of offering quality of service

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<sup>23</sup> International evidence documents that countries with regulatory regimes that have been more successful at promoting third party access and competition to core network facilities have developed higher quality broadband systems and more next generation fibre diffusion. See: Rajabiun R & Middleton, C. "Regulation, investment and efficiency in the transition to next generation broadband networks: Evidence from the European Union" *Telematics and Informatics* 32.2 (2015): 230-244. Available at: <http://www.sciencedirect.com/science/article/pii/S0736585314000549>

guarantees for critical industry and public sector applications. Extensive letters of support and stakeholder input provided in the design of SWIFT by a diverse range of businesses and public sector organizations illustrate broad recognition of the problem WOWC is trying to solve with this initiative.

### 1.3. Baseline financial model

30. High-level cost estimates: According to the SWIFT business plan, it will cost approximately \$3 bil. to connect everyone in the Region to fibre optic networks.<sup>24</sup> Given there are around 1.25 mil. households in South Western Ontario (SWO), this implies an average per household FTTP connection cost of around \$2500. This estimate seems reasonable for relatively rural areas of the Region and is consistent with estimates from FTTP deployments in other countries.<sup>25</sup> For individual communities and areas within them, actual costs can be substantially lower or higher than this average rate. Furthermore, end user surveys from SWO indicate that average Internet access subscription rates on relatively slow and asymmetric legacy platforms currently available is around \$65 per month. At this price, the payback period to deploying FTTP to a particular location would be around 4 years.<sup>26</sup> Such a payback period might seem like an attractive opportunity for investors in most other industries, but it is apparently not sufficient to motivate Canadian telecom service providers to deploy fibre last mile connections even in relatively low cost/more densely populated urban and suburban areas of the country.<sup>27</sup>
31. SWIFT contribution: Long term financial estimates developed by BDO indicate that SWIFT is designed to generate around \$1 bil. towards the total \$3 bil. of fixed capital expenditures that will be required to achieve WOWC's objective of ubiquitous fibre access over the 25 years (5 year deployment, 10 year operational phases). In addition to around \$220 mil. in initial public funding, this translates to around \$800 mil. in additional private investments towards increasing the long term pace of progress in network development relative to current levels. While it is beyond the scope of this review to evaluate the engineering costs assessments for deploying the network, the overall number of \$287 mil. appears consistent with estimates from previous broadband improvement programs in rural Ontario such as EORN and estimates provided by facilities operators in

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<sup>24</sup> Page 9.

<sup>25</sup> Domingo, A., Van der Wee, M., Verbrugge, S., & Oliver, M. (2014). Deployment strategies for FTTH networks and their impact on the business case: A comparison of case studies. In *20th ITS Biennial Conference, Rio de Janeiro 2014: The Net and the Internet-Emerging Markets and Policies* (No. 106863). International Telecommunications Society (ITS). Available at: <http://www.econstor.eu/bitstream/10419/106863/1/816637695.pdf>

<sup>26</sup> In more rural and remote areas the payback period to fibre can reach 7 to 10 years. See Alcatel-Lucent (2011). *Rural Broadband Financial Modeling*. Retrieved from [http://www3.alcatellucent.com/belllabs/advisoryservices/documents/Rural\\_Broadband\\_Financial\\_Modeling\\_EN\\_Market\\_Analysis.pdf](http://www3.alcatellucent.com/belllabs/advisoryservices/documents/Rural_Broadband_Financial_Modeling_EN_Market_Analysis.pdf)

<sup>27</sup> In general terms, this is because free cash flows from earlier investments in legacy platforms limit the incentives for incumbents to absorb the fixed costs of new technology deployments.

Western Ontario that provided feedback to WOWC in developing the SWIFT business plan.<sup>28</sup>

32. Key assumptions: Depending on the level of private sector contribution in the deployment phase of the project, there can be some additional funds that can go into immediate FTTP deployments as the SWIFT Regional backbone becomes operational (between \$50-70 mil). However, the baseline financial model developed by BDO takes a “green field” approach that incorporates conservative assumptions about the potential private contribution in the first stages of the project (for example in terms of access to excess fibre capacity where it has been already installed by an operator using Indefeasible Right of Use (IRU) agreements). Furthermore, estimates of expected SWIFT and private sector revenues assume that there will be constraints to the ability of service providers to charge a price for FTTP that is substantially more than legacy platforms, realized revenues on the Regional network will grow slowly to around 50% of the regional market by 2040, and that that SWIFT will collect 3.5% of additional revenues as the economic development “levy” or “residual”. These assumptions also seem sufficiently conservative and reasonable, but will be tested in detail in the second part of this review. The baseline model does not incorporate significant revenue from mobile Internet access, only a nominal fee for providing backhaul services to 4G LTE networks around the Region. Given the rapid growth in demand for mobile data services and current gaps in the Regions’ mobile infrastructure, this reviewer suspects that this assumption might be a bit too conservative and generating higher revenues from mobile tower backhaul via SWIFT could be feasible. Nevertheless, this feature of the baseline model enhances its robustness and highlights the BDO approach to financial modeling of the SWIFT strategy as a “worse case” scenario.
33. Cash flow estimates: Table 1 provides an overview of the cash flow estimates provided to this reviewer by BDO over the 20 years following the first 5 year deployment period (for the deployment phase the business model assumes that the revenues will be close to zero). This is a reasonable assumption for the “worse case” approach to modeling the project, particularly in the deployment stage of SWIFT. By the end of the initial build phase, the SWIFT business model aims to allocate \$273 mil. out of the \$287 mil. to cover remaining gaps in terms of fibre transport coverage in the Region and to upgrade existing facilities to Metro Ethernet standards, leaving a \$14 mil. account surplus to cover potential contingencies.<sup>29</sup> This starting reserve fund would be around 6 times the estimated annual operational costs of SWIFT in the first few years, which enhances the project’s financial viability when it will be just beginning to generate traffic and revenues from larger users and service providers. The reserve provides some insurance if demand

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<sup>28</sup> Please note some incumbent providers did not cooperate with WOWC in developing the business plan in terms of providing information about their existing facilities and how much it will cost to improve them. Some providers have said they will provide the necessary information when WOWC initiates SWIFT RFQ and RFP processes. The lack of sufficient data from the operators creates some uncertainties about the baseline estimates prepared by BDO and used in this review. For this reason, this reviewer provides a detailed sensitivity analysis to provide WOWC, the province, and potentially federal funders with the best possible advice.

<sup>29</sup> See Table 25.

does not grow as fast as expected, or can be allocated to last mile FTTP deployments if SWIFT attracts more traffic earlier than expected.

<b>Table 1. SWIFT Baseline Model Estimates</b>					
	SWIFT Revenues	SWIFT Expenses	SWIFT Net Position	Service Provider Benefits	SWIFT + Providers
2021	0.4	-2.2	-1.8	0.0	0.4
2022	0.8	-2.3	-1.5	0.0	0.8
2023	1.4	-2.3	-0.9	0.0	1.4
2024	1.9	-2.3	-0.4	0.0	1.9
2025	9.2	-2.5	6.7	22.9	32.1
2026	8.2	-3.0	5.2	22.4	30.6
2027	8.6	-3.0	5.6	24.2	32.8
2028	9.3	-3.0	6.3	27.1	36.4
2029	10.1	-3.0	7.1	30.4	40.6
2030	17.4	-3.3	14.1	60.3	77.7
2031	16.0	-3.3	12.7	54.5	70.5
2032	17.0	-3.3	13.7	58.6	75.6
2033	18.0	-3.3	14.7	62.9	81.0
2034	19.3	-3.4	15.9	68.2	87.5
2035	21.2	-3.5	17.7	76.0	97.2
2036	23.5	-3.6	19.9	56.8	80.3
2037	24.6	-3.6	21.0	59.9	84.5
2038	25.1	-3.6	21.5	61.3	86.4
2039	27.2	-3.7	23.6	67.3	94.5
2040	27.6	-3.7	23.9	68.3	95.9
<b>TOTAL</b>	<b>287.0</b>	<b>-62.1</b>	<b>224.9</b>	<b>821.1</b>	<b>1108.1</b>
Average	<b>14.3</b>	<b>-3.1</b>	11.2	41.1	55.4
Median	16.5	-3.3	13.2	55.7	73.1

34. Financial sustainability: Operating margins for SWIFT are designed to be on average 4 times lower than expected annual revenues it plans to generate from the economic development fee on Regional aggregation and transport services it will offer. In the first few years of the project SWIFT is expected to have a net negative cash flow position, which highlights the importance of the post deployment reserve fund noted above in the first five years of operational stage. According to base line data in Table 1, BDO estimates that SWIFT revenues will jump significantly in 2025 and 2030, and more smoothly in the subsequent decade. It is the opinion of this reviewer that actual growth rate in revenues in the first decade of the project is more likely to follow more of an exponential path and then become more incremental.

35. Economic development residual: At the fixed pricing assumption of 3.5% of revenues, SWIFT is designed to generate a total of \$225 mil. for the WOWC to reinvest into further network improvements over the 20 year operational phase. This size of this residual will be relatively low in the first decade of the project, but is estimated to provide just over \$20 mil. per year between 2030-2040. This fund can be leveraged to promote further private investment to help address remaining market failures in FTTP diffusion in relatively higher cost areas of the Region. The SWIFT business model/plan does not specify exactly how these funds will be allocated or how much private capital expenditures can be generated from the public funds. This flexibility seems appropriate at this stage of the process to this reviewer. As long as WOWC maintain strategic control over SWIFT, it can decide how to allocate these funds once the initial deployment phase has been completed and demand for its services start to grow in the 2020 to 2030 period. Without any further public or private sector contributions, for SWIFT to generate its \$1 bil. contribution target to the \$3 bil. total estimated cost of extending fibre optics to everyone in the Region, it will need a private sector contribution multiplier of around 4 to the public subsidies it expects to generate.
36. Private sector gains: The innovative feature of the SWIFT business model/case is its emphasis on maximizing private sector contribution through higher quality/low cost access to an integrated Regional backbone that enables service provider to deliver the type of connectivity services specified in the technical design of SWIFT by WOWC. BDO estimates the total private benefits available from operators' participation in the project to be \$820 mil., generating a total public and private benefit of just over \$1.1 bil. over the 20 year operational phase of the project. To capture the relevance of this estimate, consider the fact that there are around 3 mil. residents and 1.25 mil. households in the Region, who are currently paying an average of \$65 per month for services on legacy copper/DSL and cable last mile platforms. At an 80% penetration rate (national average per CRTC data), this means the size of the fixed broadband market in SWO is about \$800 mil. on an annual basis. This implies total private benefits from SWIFT are estimated to be around 5% of the total size the fixed broadband market. Given the vast superiority of the service that can be delivered over SWIFT's regional Metro Ethernet network, this assumption appears to be relatively conservative also and consistent with BDO's so-called "worse case" scenario for developing the business plan. Given the gaps in the transport facilities and available speeds in the Region detailed in the SWIFT Feasibility Study, private gains are likely to be higher than those assumed in the baseline SWIFT business model/case financial estimates.
37. Public versus private reinvestments: Combined cash flows to SWIFT and private operators that choose to participate in the initiative to deploy next generation service in partnership with WOWC are estimated to be around \$1.1 bil. over the 20 years, accounting for about 1/3 of what is needed to achieve the objective of extending fibre optic connectivity to everyone in the Region. However, it is important to note that private sector operators may have limited incentives to reinvest these gains in the Region because they might have opportunities to make a higher rate of return in other projects that serve the interests of their investors. With an equity stake in the project WOWC can direct how SWIFT Inc. allocates the so-called economic development fee/residual, but it

will have little power over reinvestment decisions of private partners in the project once subsidies have been allocated to them. For this reason it will be important for WOWC/SWIFT to engage in vigorous negotiations with potential private partners to maximize their long term commitments for investing in the Regions' broadband infrastructure and channel their retail market traffic to SWIFT.

38. Private commitments: Obligations that restrict future capital expenditure decisions of operators might be very hard to obtain, but asking for them provides a valuable starting position in the negotiations about the allocation of added value/profits SWIFT will generate for participating telecom service providers. As SWIFT become operational and generates operational residuals to reinvest in last mile FTTP networks in undeserved area of SWO, recurring procurement processes will generate further opportunities to incentivise private capital expenditures and commit service providers to direct last mile traffic to the SWIFT middle mile/transport network. In addition to faster throughput and available minimum service quality guarantees for applications that require them, ubiquitous access to a Metro Ethernet enabled backbone in SWO will reduce operational costs of service providers relative to the current mix of legacy access and content provisioning standards. If they choose to cooperate with SWIFT, incumbents can improve services they offer higher volume/margin customers at a lower cost. This will make it increasingly economical for them to transition more retail customers from their own legacy middle mile/transport facilities to the higher quality shared infrastructure that SWIFT proposes to deploy across the Region. The added value from the upgraded SWIFT backbone to potential private partners represents the key source of leverage for WOWC/SWIFT Inc. for maximizing long term service provider capital expenditures and traffic allocation to SWIFT.

#### **1.4. Private sector incentives and alternative policy options**

39. Market failures and public investment: The SWIFT Feasibility Study provided the WOWC with a mapping of the current state of the network, documenting extensive gaps in the coverage and quality of fixed and mobile infrastructure available in the Region. Determining the extent of existing and projected infrastructure gaps is significant, WOWC mandated the development of the SWIFT business model/case. Using baseline financial estimates provided by BDO and detailed above, this section explores alternative policy options that are available for the WOWC and other entities interested in addressing current and projected gaps in the Regions broadband infrastructure. A basic question in evaluating available policy options why private sector incentives to invest in extensions and capacity enhancement specified in the SWIFT technical design appears to be limited and public inducements might be needed. The subsequent sections in this report will then evaluate the sensitivity of the results obtained here to the specific questions raised by WOWC and MEDEI in the Statement of Work for this review.
40. Future discounting: Borrowing costs and expectations of returns to investment can have a critical impact on evaluating a long term project such as SWIFT. According to estimates submitted by the Competition Bureau to the CRTC, large operators in Canada can earn a long term Internal Rate of Return (IRR) of around 13% on their investments in mobile

networks and have a Weighted Average Cost of Capital (WACC) of about 10%.<sup>30</sup> Given that fixed networks are substantially more capital intensive to deploy, the expected IRR on mobile investments represent a useful benchmark as the minimum reservation return of Canadian service providers. We also evaluate various issues with respect to a 5% benchmark (e.g. on secured lending) and 2.5% (the long term borrowing and infrastructure lending rate of the Government of Ontario). In addition to SWIFT there are three other general policy options available to WOWC and higher levels of government:

41. A) Doing nothing: Due to the scarcity of public funds and other spending priorities, one policy option would be not to adopt SWIFT or other potential program design strategies in the Region and hope that market forces will address concerns about remaining coverage gaps and relatively low service quality/speeds.<sup>31</sup> To evaluate this public policy option, consider the financial problem facing a hypothetical telecom service provider contemplating investing in a SWIFT like Regional backbone in SWO without any public support. Table 2 provides a baseline model of the expected payoff a provider can expect from spending the same level of capital expenditures to bring the Regional network up to standards specified by WOWC for SWIFT.<sup>32</sup> The cash flows in the model include those BDO estimates will accrue to SWIFT plus net private sector benefits expected from planned extensions and upgrades in the SWO (i.e. around a 5% increase in the total fixed broadband market size, or less than 2% of total fixed plus mobile current market size in the Region over the life of the project).

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<sup>30</sup> Canadian Wireless Market Performance and the Potential Effect of an Additional Nationwide Carrier. Submission to the CRTC by the Competition Bureau, prepared by the Brattle Group. Available at: [http://www.brattle.com/system/news/pdfs/000/000/736/original/Canadian\\_Wireless\\_Market\\_Performance\\_and\\_the\\_Potential\\_Effect\\_of\\_an\\_Additional\\_Nationwide\\_Carrier.pdf?1412262049](http://www.brattle.com/system/news/pdfs/000/000/736/original/Canadian_Wireless_Market_Performance_and_the_Potential_Effect_of_an_Additional_Nationwide_Carrier.pdf?1412262049)

<sup>31</sup> Notably, fibre diffusion and average speeds at the national level are substantially below those in leading international jurisdictions.

<sup>32</sup> Please note the models start from “year one” of the operational phase of the project, but do not incorporate the \$14 mil. residual net positive balance that the SWIFT business plan aims to retain after the deployment phase of the project. Consequently, instead of \$287 in initial capital expenditures, they account only for year operational expenses and are therefore estimated at \$285 mil.

Table 2. Private Sector Case to Upgrade the Regional Network to SWIFT Standards							
Year	Expenditure	Private revenue growth	Net revenue	PV at 10%	at 13%	at 5%	at 2.5%
0	<b>285.0</b>	0.4	-284.6	-284.6	-284.6	-284.6	-284.6
1	2.3	0.8	-1.5	-1.3	-1.3	-1.4	-1.4
2	2.3	1.4	-0.9	-0.8	-0.7	-0.8	-0.9
3	2.3	1.9	-0.4	-0.3	-0.3	-0.4	-0.4
4	2.5	32.1	29.6	20.2	18.2	24.4	26.8
5	3.0	30.6	27.6	17.1	15.0	21.6	24.4
6	3.0	32.8	29.8	16.8	14.3	22.2	25.7
7	3.0	36.4	33.4	17.1	14.2	23.7	28.1
8	3.0	40.6	37.5	17.5	14.1	25.4	30.8
9	3.3	77.7	74.3	31.5	24.7	47.9	59.5
10	3.3	70.5	67.2	25.9	19.8	41.3	52.5
11	3.3	75.6	72.3	25.3	18.9	42.3	55.1
12	3.3	81.0	77.6	24.7	17.9	43.2	57.7
13	3.4	87.5	84.1	24.4	17.2	44.6	61.0
14	3.5	97.2	93.7	24.7	16.9	47.3	66.3
15	3.6	80.3	76.7	18.4	12.3	36.9	53.0
16	3.6	84.5	80.9	17.6	11.4	37.1	54.5
17	3.6	86.4	82.8	16.4	10.4	36.1	54.4
18	3.7	94.5	90.9	16.3	10.1	37.8	58.3
19	3.7	95.9	92.2	15.1	9.0	36.5	57.7
	<b>Total</b>	<b>1108.1</b>	<b>763.3</b>	42.1	-42.5	281.1	478.5
		<b>IRR</b>	<b>11%</b>				

42. Market failures: In this model of the business case facing a hypothetical private service provider, capital expenditures in upgrading the Regional network to WOWC specifications would generate a positive IRR of 11%. This is just above the estimate WACC of large Canadian operators.<sup>33</sup> This suggests that operators would not lose money if they were to engage in the project by themselves without additional public subsidies. However, the projected IRR would be below the 13% long term expected return that operators can obtain from channelling their capital expenditures into mobile networks and other higher margin investment opportunities that might be available to them (e.g. FTTP in urban areas, media assets, data centres, etc.). The model helps explain why vertically integrated incumbent operators that dominate the SWO market have not addressed infrastructure gaps that WOWC is trying to address with SWIFT. It also illustrates that underinvestment in the Regional transport facilities will likely persist in

<sup>33</sup> Smaller entities are likely to have higher costs of raising fixed capital inputs than this benchmark.

the future without some form of public sector inducements that improve the business case for investing in required extensions and capacity upgrades. At the public discount rate of 2.5%, the present value of investing in the project would be just under half a billion dollars. At the private sector borrowing and reservation IRR threshold the private business case for making investments the Region requires is simply not there.

43. B) Transport network subsidies only: Instead of the integrated approach to addressing market failures in both transport and access facilities of the Region, a second option could be to simply provide a private provider with subsidies to improve the Regions' transport facilities to the standards WOWC specifies. In such a case the Region would gain a better backhaul infrastructure than the option of doing nothing, but there will be little public control over how the provider chooses to operate the network, prices it charges, service quality it delivers, and how much of the gains are reinvested in last mile FTTP deployments in underserved areas. Providing substantive public subsidies to one of the three operators that currently have transport facilities in the SWO (Bell, Rogers, and Hydro One), or a potential entrant, will inevitably put entities that are not selected at a distinct competitive disadvantage and distort competition. This option can also increase the total capital expenditures that are required relative to SWIFT because the current fibre networks of operators do not necessarily overlap. SWIFT design attempts to address this using long term IRU agreements that minimize the potential for duplications/overbuild on top of existing facilities where they are available, and only building new fibre assets where they are not currently available. The economic development residual and competitive neutrality principles in SWIFT are particularly relevant when we consider the proposal relative to the simpler policy solution of just subsidizing a telecom provider to deliver the open access Regional network WOWC is trying to deploy with SWIFT.
44. C) Access network subsidies only: A third options would be to ignore concerns about the reach and quality of the Regions' middle mile/transport facilities and only to provide subsidies to last mile providers in high cost rural areas. The federal government and a number of provincial rural broadband improvement programs have adopted this approach. However, over the past few years it has become increasingly evident that these programs can be particularly expensive and unsustainable in their capacity to meet rapidly growing demand by end users for resource intensive Internet applications.<sup>34</sup> The expensive nature of this approach is evident in the \$3 bil. estimated capital expenditures required for achieving the objective set out by WOWC to extend fibre optics to everyone in the Region in the next 25 years.<sup>35</sup> The proposed funding for SWIFT to upgrade middle mile/transport facilities and deploy a relatively higher quality open access Regional backbone is only about 10% of this total. Furthermore, facilities that aggregate traffic

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<sup>34</sup> Rajabiani, R., & Middleton, C. (2013). Rural Broadband Development in Canada's Provinces: An Overview of Policy Approaches. *The Journal of Rural and Community Development*, 8(2), 7-22. <http://www.jrcd.ca/viewarticle.php?id=1140>

<sup>35</sup> In addition to significant differences in the cost of FTTP deployments across communities with varied geographies and population distribution characteristics, it is relevant to note that in the very long term technological innovation is likely to reduce the costs of fibre deployments. Consequently, waiting to allocate last mile local access network subsidies until after the Regions' transport facilities have been upgraded and extended that can handle retail traffic for advanced applications is likely to reduce expected total costs of the transition to next generation broadband.

from communities across the Region and transport data will still need to be upgraded. A group of smaller service providers have provided the WOWC with a proposal along the lines of this option, which will be analyzed on its merits in a separate report by this reviewer.<sup>36</sup>

45. Strategic subsidies and private incentives: Table 3 presents a model in which the province and federal government each contribute 1/3 towards the total eligible capital expenditures of \$287 mil for SWIFT. Compared to the case presented in Table 2 in which private sector incentives are too weak to invest, the expected private operators' IRR in this model with 2/3 public subsidies from higher levels of government becomes increasingly attractive (24% versus 11% without subsidies).<sup>37</sup> Table 4 and 5, which are not included in this document due to their relevance for the proposed RFI/RQ process, decompose the net benefits to both public and private sector into its public (WOWC) and private (service provider) sector components. They document that the SWIFT model is well balanced in its design in terms of allocating the net internal benefits from engaging in the project between the public and private sector. In practice, how the added value from SWIFT is allocated between the publicly retained economic development residual/fee and telecom service provider operating margins will depend, among other factors, on the design of the initial RFQ and RFP processes for deploying the Regional network.

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<sup>36</sup> Expected to be completed and delivered to WOWC and MEDEI by mid August.

<sup>37</sup> Please note that this is only a financial analysis of "internal" returns to SWIFT investors, ignoring the broader economic value associated with improvements in broadband access and service quality will have for residents, businesses, and public sector end users.

**Table 3. SWIFT Net Internal Benefits to WOWC and Service Providers**  
(with 2/3 funding from ON/Fed.)

Year	Expenditure	Revenue increase	Net revenue	PV at 10%	at 13%	at 5%	at 2.5%
0	<b>95.0</b>	0.4	-94.6	-94.6	-83.7	-90.1	-92.3
1	2.3	0.8	-1.5	-1.3	-1.1	-1.3	-1.4
2	2.3	1.4	-0.9	-0.8	-0.6	-0.8	-0.8
3	2.3	1.9	-0.4	-0.3	-0.3	-0.4	-0.4
4	2.5	32.1	29.6	20.2	16.1	23.2	26.2
5	3.0	30.6	27.6	17.1	13.3	20.6	23.8
6	3.0	32.8	29.8	16.8	12.7	21.2	25.1
7	3.0	36.4	33.4	17.1	12.6	22.6	27.4
8	3.0	40.6	37.5	17.5	12.5	24.2	30.0
9	3.3	77.7	74.3	31.5	21.9	45.6	58.1
10	3.3	70.5	67.2	25.9	17.5	39.3	51.2
11	3.3	75.6	72.3	25.3	16.7	40.3	53.8
12	3.3	81.0	77.6	24.7	15.8	41.2	56.3
13	3.4	87.5	84.1	24.4	15.2	42.5	59.5
14	3.5	97.2	93.7	24.7	15.0	45.1	64.7
15	3.6	80.3	76.7	18.4	10.9	35.1	51.7
16	3.6	84.5	80.9	17.6	10.1	35.3	53.2
17	3.6	86.4	82.8	16.4	9.2	34.4	53.1
18	3.7	94.5	90.9	16.3	8.9	36.0	56.8
19	3.7	95.9	92.2	15.1	92.2	92.2	92.2
Total	59.8	<b>1108.1</b>	<b>953.3</b>	232.1	214.7	506.1	688.1
		<b>IRR</b>	<b>24%</b>				

## **2. Sensitivity analysis of the SWIFT business model/case**

46. The overview of the motivation, design, and returns to public and private sectors in participation in SWIFT provides the basis for answering specific questions raised in the Statement of Work of this review.

### **2.1. Assess business model/case scenarios based on different levels of telecom service providers' participation.**

47. Risk mitigation: The SWIFT technical design aims to minimize the costs of upgrading the Regional network by utilizing as much existing fibre capacity as possible, and only then allocating strategic subsidies to building new facilities (using IRUs). The success of this design strategy will depend on the level of participation by existing facilities based providers in the Region to make their excess fibre transport facilities available to an open access and neutral network that aims to offer high quality/lower price wholesale services to last mile service providers and large enterprise and public sector end users in the Region. Since the CRTC does not mandate third party access to existing transport facilities and dark fibre, the potential to lose the advantages that control over transport facilities provides in retail markets may lead some incumbent operators to feel threatened by the competition SWIFT can create in the provision of broadband access services. As detailed in the baseline financial analysis of the project in the last section, the SWIFT business model/case appears to recognize this resistance and tries to address it by offering potential private sector partners with more than a reasonable offer of returns on their participation in the public initiative.
48. Future discounting and potential partner strategies: While the benefits of public subsidies and lower cost/higher quality transport might be attractive to some potential partners, incumbent legacy access network providers can have strong economic incentives to limit their participation in the proposed SWIFT RFQ and RFP processes. As the position of ITPA documented in the SWIFT Feasibility Study and its alternative proposal indicate, the potential for increasing competition and better services delivered via the upgraded and open access SWIFT network can motivate others to actively resist efforts by WOWC to deploy a Regional fibre network capable of supporting its broader long term economic development strategy. This is because free cash flows from legacy platforms provide their operators with strong short term incentives to protect their retail markets against potential competition before SWIFT is deployed. Once the Regional network is funded, some of legacy access network providers will find it very advantageous to employ subsidies from WOWC/SWIFT Inc. to extend and upgrade their own facilities in communities across the Region. Because these incumbents already have some facilities that may not all need to be duplicated to reach SWIFT standards of service, they are likely to also have a considerable cost advantage relative to potential entrants in proposed SWIFT RFQ and RFP processes. In parts of the Region where legacy network providers choose not to participate with public/private co-investments strategy SWIFT proposes, potential entrants can be encouraged to fill the gaps in building fibre transport facilities and next generation FTTP networks. It is not surprising that the long term public sector objectives stipulated by WOWC may not be aligned with the interests of all incumbents.

However, it is the opinion of this reviewer that responses from larger facilities based operators in the Region clearly document that the upgrades SWIFT proposes are necessary. Furthermore, there appears to be substantive support for SWIFT's approach to the problem by relatively larger service providers that serve the Region (see responses by Hydro One, Cogeco, Rogers, and Bell to SWIFT consultations detailed in the Feasibility Study).

49. Key actors and their potential strategies: In Western Ontario small incumbent local exchange carriers (SILECS) that currently rely on legacy copper/DSL last mile networks to serve their customers have under 35,000 subscribers.<sup>38</sup> This is substantially less than 5% of the total SWO residential market that SWIFT is trying to serve, suggesting that the implementation of the SWIFT business/case model will not be very sensitive to participation by the SILECS. Ensuring that large legacy DSL and cable network operators that currently serve the vast majority of end users in the Region will help minimize the costs of upgrading transport facilities in the deployment phase and maximizing potential revenues WOWC/SWIFT Inc. can generate to reinvest in FTTP deployments in underserved areas of the Region between 2020 and 2040. These same operators are also dominant in the mobile market and require backhaul facilities for 4G LTE. Consequently, working with incumbents with existing facilities will reduce short term deployment costs of the project. However, some of the incumbents may not be willing to engage in a project that offers the Region a high quality/low cost alternative because it would allow large end users (e.g. large enterprises, MUSH sector) and potential entrants with competitive access to transport facilities that enables them to bypass the incumbents' offerings on legacy platforms.
50. Risk factors: The inherent resistance to this process of disintermediation represents the key risk factor in the level and nature of service provider participation in SWIFT. Although the three larger facilities based operators needed to minimize SWIFT's costs of upgrading and extending transport infrastructure have indicated some degree of support for the project, their actual commitment levels will not be clear until the proposed SWIFT deployment RFQ/RFP process. It should be noted that the two larger players (Bell and Rogers) may not be that keen to work together and participate in a project that might benefit the other. This is because the two companies are competitors in a large number of broader markets, which may influence their strategies in Regional market such as Western Ontario and the Niagara Region. Another potential contributor in terms of IRUs and other existing facilities that could be incorporated into SWIFT to reduce deployment costs and increase FTTP access network subsidies (Hydro One), is currently going through privatization. Uncertainties associated with the Hydro One privatization process will likely have a negative impact on its ability to commit to long term partnerships and agreements. On the other hand, if the province is going to privatize Hydro One, it might offer a good opportunity for WOWC/SWIFT to procure some critical telecom network assets at a reasonable price (prior or right after privatization as old/new ownership reorganizes Hydro One).

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<sup>38</sup> SWIFT Feasibility Study, Table 19, page 73.

51. Sensitivity analysis: To evaluate the potential impact of service provider participation, as well as other risk factors detailed in the subsequent section, it is useful to test the sensitivity of the baseline cash flow estimates analyzed in the previous section. To do so, we take the baseline revenue and expense estimates developed for SWIFT by BDO as the median/likely scenario and adjust them along two different paths to reflect worse/pessimistic and best/optimistic scenarios of how the project can evolve. Specifically, during the initial 10 years of the project, we smooth the expected rate of growth in revenues relative to the BDO estimates by assuming that they increase exponentially to reach a maximum threshold for the second decade. For the period between 2030 to 2040, the best case scenario is evaluated by assuming that expected revenues will be twice the baseline estimates and in the worse case they will be half those predicted by BDO.<sup>39</sup> In the best case, for example in which large incumbents such as Bell and Rogers choose to work with WOWC/SWIFT to deliver higher quality last mile services to their customers, rate of return on WOWC equity in SWIFT Inc. begins to explode and more than \$500 mil. in further residuals will become available for subsidizing last mile FTTP deployments (Table 6). In the very pessimistic case that large fixed and mobile operators choose not to cooperate in terms of directing traffic in the 2030-2040 period, SWIFT still has as positive Net Present Value. However, in the pessimistic case the total economic development residual for addressing last mile market failures could be as low as \$100 mil (Table 7). The sensitivity analysis of SWIFT's exposure to risk of the two divergent paths for the evolution of its long term operating profits confirms the opinion that it represents a realistic and sustainable plan for achieving objectives set out by WOWC.

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<sup>39</sup> BDO estimates SWIFT revenue between 203-2040 to average around \$22 mil. annually. In the best case we assume this will reach \$44 mil. and in the bad case \$11 mil. in the second half of the operational life of the project.

**Table 6. SWIFT Sensitivity Analysis: Optimistic Scenario**

Year	Expenditure	Revenue increase	Net revenue	PV at 10%	at 13%	at 5%	at 2.5%
0	<b>20.0</b>	0.0	-20.0	-20.0	-20.0	-20.0	-20.0
1	2.3	0.0	-2.3	-2.1	-2.0	-2.2	-2.3
2	2.3	2.0	-0.3	-0.3	-0.3	-0.3	-0.3
3	2.3	4.0	1.7	1.3	1.2	1.5	1.6
4	2.5	8.0	5.5	3.7	3.4	4.5	5.0
5	3.0	16.0	13.0	8.1	7.1	10.2	11.5
6	3.0	32.0	29.0	16.4	13.9	21.6	25.0
7	3.0	44.0	41.0	21.0	17.4	29.1	34.5
8	3.0	44.0	41.0	19.1	15.4	27.7	33.6
9	3.3	44.0	40.7	17.3	13.5	26.2	32.6
10	3.3	44.0	40.7	15.7	12.0	25.0	31.8
11	3.3	44.0	40.7	14.3	10.6	23.8	31.0
12	3.3	44.0	40.7	13.0	9.4	22.6	30.2
13	3.4	44.0	40.6	11.8	8.3	21.5	29.5
14	3.5	44.0	40.5	10.7	7.3	20.5	28.7
15	3.6	44.0	40.4	9.7	6.5	19.4	27.9
16	3.6	44.0	40.4	8.8	5.7	18.5	27.2
17	3.6	44.0	40.4	8.0	5.1	17.6	26.5
18	3.7	44.0	40.3	7.3	4.5	16.8	25.9
19	3.7	44.0	40.3	6.6	4.0	16.0	25.2
		<b>634.0</b>	<b>554.2</b>	170.1	122.8	300.1	405.0
		<b>IRR</b>	<b>40%</b>				

**Table 7. SWIFT Sensitivity Analysis: Pessimistic Scenario**

Year	Expenditure	Revenue increase	Net revenue	PV at 10%	At 13%	at 5%	at 2.5%
0	<b>20.0</b>	0.0	-20.0	-20.0	-20.0	-20.0	-20.0
1	2.3	0.0	-2.3	-2.1	-2.0	-2.2	-2.3
2	2.3	2.0	-0.3	-0.3	-0.3	-0.3	-0.3
3	2.3	4.0	1.7	1.3	1.2	1.5	1.6
4	2.5	8.0	5.5	3.7	3.4	4.5	5.0
5	3.0	9.0	6.0	3.7	3.3	4.7	5.3
6	3.0	10.0	7.0	3.9	3.4	5.2	6.0
7	3.0	11.0	8.0	4.1	3.4	5.7	6.7
8	3.0	11.0	8.0	3.7	3.0	5.4	6.5
9	3.3	11.0	7.7	3.3	2.6	5.0	6.2
10	3.3	11.0	7.7	3.0	2.3	4.7	6.0
11	3.3	11.0	7.7	2.7	2.0	4.5	5.9
12	3.3	11.0	7.7	2.4	1.8	4.3	5.7
13	3.4	11.0	7.6	2.2	1.6	4.0	5.5
14	3.5	11.0	7.5	2.0	1.4	3.8	5.3
15	3.6	11.0	7.4	1.8	1.2	3.6	5.1
16	3.6	11.0	7.4	1.6	1.0	3.4	5.0
17	3.6	11.0	7.4	1.5	0.9	3.2	4.9
18	3.7	11.0	7.3	1.3	0.8	3.0	4.7
19	3.7	11.0	7.3	1.2	0.7	2.9	4.6
		<b>176.0</b>	<b>96.2</b>	21.0	11.4	46.8	67.3
		<b>IRR</b>	<b>19%</b>				

**2.2 Assess how the SWIFT network would advance last mile deployment in each scenario.**

52. Last mile strategy: SWIFT aims to extend fibre optics to everyone in the Region by 2040, a project that it estimates will cost around \$3 bil.<sup>40</sup> Given the relatively slow pace of FTTP diffusion at the national level, achieving this aim would likely make SWO one of the leading Regions in the country in terms of broadband infrastructure quality. There are two key elements in the SWIFT design strategy aimed at advancing last mile deployments. First, the SWIFT Regional network will extend and upgrade transport facilities to Metro Ethernet standards, reducing the costs and improving the quality of

<sup>40</sup> It is noteworthy that this estimate is based on current prices of extending FTTP connectivity, which are likely to decline overtime with further technological innovation and standardization in fibre last mile broadband technologies.

wholesale services available to last mile providers. Second, the baseline SWIFT business model/case estimates it will generate between \$200 to \$300 mil. in residual income to subsidize last mile deployments over its lifetime. This would translate to just around 10% of total funds needed for achieving the goal of ubiquitous fibre optic availability by 2040. Leveraging the scarce resources SWIFT will generate to maximize private sector investments on top of the economic development residual will be critical for the long term success of the project.

53. Deployment cost savings and the timing of last mile subsidies: As detailed in the analysis of current and future states in the SWIFT Feasibility Study, there are potentially significant cost savings in the deployment stage of the process if SWIFT partners with one, or a consortium, of the larger facilities based operators in the SWO with existing fibre assets (Bell, Rogers, Cogeco, Hydro One) who are willing to enter into long term dark fibre IRU agreements with SWIFT. In theory, and subject to technical verification of fibre quality, as much as 50% of the proposed network can be procured through IRU, while the rest needs to be built.<sup>41</sup> The SWIFT business model/case assumes that only around 30% of the network will be procured through IRUs, which is a reasonable assumption given that not all incumbents with essential facilities may be willing to provide WOWC/SWIFT with IRU agreements.<sup>42</sup> If the level of private sector participation in the SWIFT deployment stage is higher than expected and most operators are willing to share their excess dark fibre capacity through IRUs, there would be additional savings in fixed capital expenditures that will be required to extend and upgrade the Regional backbone (potentially \$50 to \$70 mil.). These funds could be allocated to subsidize last mile FTTP deployment sooner than 2025-2030, when the baseline model expects cash flows from services on SWIFT will start to turn positive.
54. Optimistic scenario: Although BCE/Bell has not yet provided SWIFT with detailed information about their network in Western Ontario, it is clear that it has the most extensive fibre network in the Region that can be employed to develop SWIFT. Furthermore, Bell has indicated that it continues to rely on legacy transport platforms that need upgrades and has signalled some interest in participating in SWIFT to achieve this objective. Partnering with the largest incumbent would likely offer the most short term cost savings in the deployment phase of the project, than for instance working with entities with other entities as Rogers, Hydro One, Cogeco, or other entities that control relevant assets. On the other hand, Rogers, and to a lesser extent Hydro One and Cogeco also have extensive assets that could reduce SWIFT deployment costs significantly. Importantly, Bell and Rogers also dominate the retail markets in both fixed and mobile connectivity in the Region, enabling them to channel significant traffic to SWIFT that will increase long term cash flows to the project to be reinvested in last mile deployments during the operational phase of the project. Consequently, a scenario in which as many of the existing transport facilities operators and larger retail market players contribute to SWIFT represents the best case scenario in terms of both short run cost savings on

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<sup>41</sup> SWIFT Feasibility Study, page 200.

<sup>42</sup> Under the federal regulatory framework, they are not obligated to provide third party access to transport or dark fibre. Telecom Regulatory Policy Decision CRTC 2015-326. Available at: <http://www.crtc.gc.ca/eng/archive/2015/2015-326.htm>

deployment and long run traffic/revenue generation needed for last mile FTTP deployments. A model of this optimistic scenario is presented in Table 6, documenting that SWIFT revenues can increase rapidly after it has been deployed if a wide range of providers can be convinced to partner with WOWC/SWIFT early on in the life of the project. The feasibility of this best case scenario is uncertain, particularly due to subjective strategic considerations by large service providers. While difficult and potentially impossible, SWIFT should try to attract partners with significant retail market revenues to participate in the deployment phase of the project in order to increase long term operating income that will be available for last mile FTTP deployments in underserved areas between 2030 and 2040. If this more “cooperative” scenario materializes, then SWIFT residual available for last mile deployment could reach up to \$500 mil. over the lifetime of the project. This would accelerate the pace of transition from legacy to next generation broadband technologies significantly.

55. Pessimistic scenario: Although some of the larger operators have indicated their interest in SWIFT, some may choose not to participate in the proposed RFQ/RFP process for deploying the Regional strategy due to their own strategic reasons. Others may try to exact a heavy price for their cooperation, for example in terms of providing SWIFT with dark fibre IRUs during the deployment phase of the project. Due to the threat of competition it poses, some large and small incumbents may also take other measures to derail the project and its ability to serve as a long term economic development fund for promoting rural connectivity. In the longer term, if large fixed and mobile providers that dominate the retail markets choose not to backhaul their traffic through SWIFT, residuals available for FTTP deployments in higher cost parts of the Region could be lower than predicted in the baseline model developed by BDO. Nevertheless, as documented in the model of the pessimistic scenario presented in Table 7 above, the SWIFT plan has a positive net present value at the public sector discount rate even if its estimated revenues are halved relative to the baseline BDO estimates during the second decade of its operations between 2030 and 2040. In this scenario SWIFT would not be getting much traffic from large incumbents and will have to generate the residual cash flow it needs to subsidize last mile deployments by revenues from non-incumbent service providers, large enterprise, and MUSH sector end users. In this “non-cooperative” scenario, the total amount of the economic development fund that will be available for subsidizing last mile FTTP deployments could be lower than \$100 mil. In the event that incumbents choose not to cooperate with SWIFT and direct their residential and business traffic to the Regional network, SWIFT will have no option but to aggressively pursue large business users and the MUSH sector in order to generate required cross-subsidies for last mile deployments. It would also have to encourage service providers from outside the Region to enter and deploy FTTP networks in lower cost areas to increase the economic development residual. Even if this pessimistic solution emerges once SWIFT has been deployed, the project will remain financially viable and provide a basis for potential entrants, local communities, MUSH sector, and larger enterprise users to bypass the incumbents’ legacy networks. Improved wholesale service quality and prices SWIFT will offer could then have an additional positive impact by motivating large operators that dominate the Regional fixed and mobile markets to upgrade their own transport facilities

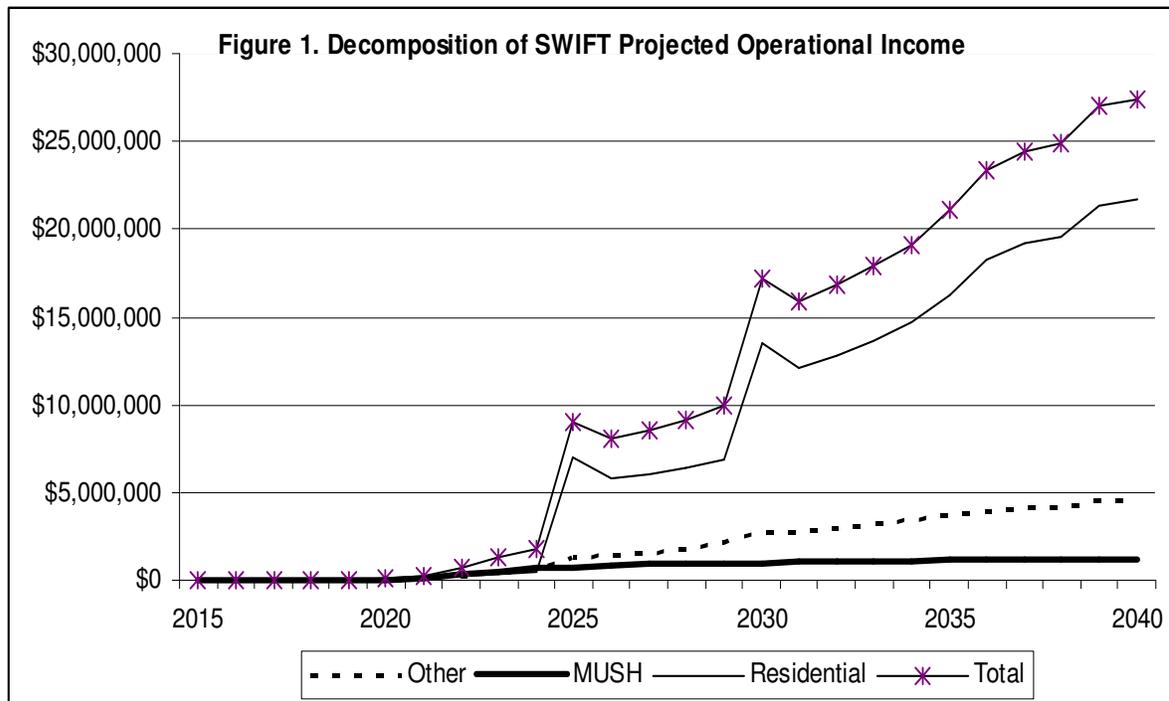
in order to compete with SWIFT. This would inevitably lead to significant duplication and not help address coverage gaps in higher cost areas of the Region.

56. Realistic scenario: Given these considerations and financial models of possible paths for the development of SWIFT, the baseline model developed by BDO appears to be relatively realistic. The exact combinations and permutations of service providers that can help reduce deployment costs and direct end user traffic to SWIFT would be hard to guess before the proposed RFQ/RFI process. Overall, Bell and Rogers are likely to have significant cost advantages due to their existing facilities in the Region and would be able to bring the most traffic to SWIFT. On the other hand, facilities based operators without significant retail operations in the Region (e.g. Hydro One, Cogeco, Telus, Allstream, Vianet, TekSavvy, Hurricane Electric) are likely to be more willing than the incumbents to accept the guiding principles WOWC has mandated in the operation and governance of SWIFT (e.g. openness, neutrality, scalability, service quality guarantees, etc). The RFQ/RFP process used to deploy SWIFT must strike the right balance between short term cost minimization and long term strategic considerations involved in working with different combinations of potential partner. Further details of this aspect of the problem can only be addressed once public funds have been committed and potential partners have provided SWIFT with their offers of contribution.
57. Last mile subsidy allocation: Although the SWIFT business case/model provides a solid plan for generating cross-subsidies required to promote last mile connectivity, it does not incorporate significant detail on how the funds are to be allocated. Since residuals from SWIFT deployment are not expected to become substantive until 2025, this is understandable at this stage of the process. In addition to relying on open bidding procedures for allocating the funds, this reviewer is of the opinion that it will be important for SWIFT to retain some measure of flexibility in allocating funds it will generate to stimulating last mile deployments. This is because program design flexibility would allow communities around the Region to experiment with deployment models that might fit their local needs and conditions. In the long term, this experimentation can help identify best practices for other communities in the Region and beyond. To ensure that SWIFT succeeds it should also not lock itself into a last mile funding arrangement with any one or group of service providers too early in the project as technological change is rapidly reducing the costs of deploying next generation FTTP networks. A detailed analysis of last mile deployment strategies available for SWIFT to employ is beyond the scope of this review, but will require future attention as the Regional network is funded and becomes operational.
58. Other last mile deployment measures: In addition to backbone to last mile cross-subsidies, there are a number of other measures that SWIFT can take to reduce the costs of last mile FTTP and 4G mile deployments. For example, it can help reduce the costs facing service providers by simplifying and streamlining the process for obtaining permits required for deploying new fibre assets across participating municipalities and townships. SWIFT can also help collect the buying power of the Region for procuring fibre assets and other required equipment at lower costs that might be available to local communities and smaller service providers. Monitoring the quality of service that last

mile providers deliver end users via a Regional test bed would further enhance market incentives to decommission legacy last mile platforms and deploy next generation FTTP network over time.<sup>43</sup> In terms of cellular network coverage and data capacity, by engaging closely with mobile operators and providing them with high quality/low cost fibre transport facilities SWIFT can reduce the costs of deploying valuable spectrum assets they have recently purchased from the federal government (e.g. 700 MHz auctions).

**3. Assess the viability of the business model/case in terms of how it addresses varying levels of participation of the Broader Public Service (BPS) sector, also known as the Municipalities Universities Schools Hospitals (MUSH) sector as the SWIFT business model/case is initially dependent on revenue from this sector.**

59. Operating revenue decomposition: To better understand the sensitivity of the SWIFT model/case with respect to particular sub-groups of end users, BDO has provided this reviewer with a breakdown of underlying demand estimates. Figure 1 provides an overview of the estimated revenues in the baseline model. It clearly documents that the capacity of SWIFT to generate a larger residual for reinvestment in underserved areas of the Region will depend on its ability to attract traffic from residential customers who are by far the largest segment of the market. The SWIFT design strategy to maximize its scarce resources by primarily working with retail service providers serving the residential market in generating the economic development residual is documented in Figure 1.



<sup>43</sup> Reza Rajabiun and Catherine Middleton. "Lemons on the Edge of the Internet: The Importance of Transparency for Broadband Network Quality" *Communications & Strategies* 98.2 (2015): 119-136. Available at: [http://works.bepress.com/reza\\_rajabiun/15](http://works.bepress.com/reza_rajabiun/15)

60. Long term sensitivity to MUSH and other non-residential: Expected revenues from the MUSH sector in the SWIFT model are negligible compared to what it can generate from a very small share of a much larger residential and business market in the Region. One reason for this is that SWIFT intends to work with service providers that currently serve these institutions to improve quality and prices using the Regional network, rather than trying to bypass them. Even at their highest estimated rates in the BDO baseline model (at the end of the life of the project in 2035-2040), SWIFT wholesale revenues will only account for about 1.2% of the total current size of the retail market for fixed and mobile services in the Region (\$30 mil. versus \$2.5 bil. annually). In other words, SWIFT is not designed to compete head on with private entities that are offering retail services to residential, business, and MUSH sector users. Instead, it offers these providers a platform that enables them to offer end users higher quality broadband connectivity and value added services on top of the upgraded and extended Regional network. This suggest WOWC and SWIFT recognize the complexity of the market for Internet access services and the advantages that private sector have in identifying and meeting demand requirements of diverse end user communities.
61. Short term sensitivity to MUSH: Table 8 provides an overview of the percentage/ratio of total estimated revenues from the MUSH sector during the first decade of the project. It is estimated that SWIFT will depend on the MUSH sector for around 30 to 40 percent of its revenues for the initial stage of the project. This is not surprising because the SWIFT design calls for deploying its 310 points-of-presence (POPs) to public sector facilities around the Region. Although once SWIFT is deployed it might be able to serve some of these institutions directly, the business plan does recognize that many MUSH sector entities might be locked into long term procurement contracts with particular operators. By working with operators that currently serve MUSH users to enable them to provide higher quality services, SWIFT tries to alleviate this problem. By not competing directly against service providers, SWIFT can try to enhance the likelihood of that a larger number of service providers choose to work with it and contribute to the project in terms of longer term demand/traffic aggregation from the much larger residential, business, and mobile connectivity markets. To account for potential contingencies a \$14 mil. projected surplus following the deployment phase of the project should be sufficient to cover SWIFT operational expenses for about the first 5 years of the operational stage of the project. The availability of this surplus will help ensure that SWIFT does not have to compete directly with service providers at the initial stages of the process in an effort to generate short term revenues. As long as service providers work with SWIFT in the medium to long term, it should be able to follow its design strategy of acting as a wholesale player with the only high quality option for procuring transport services in the Regional market. In this case, it would be in the interests of incumbents and potential entrants to focus their investments on last mile deployments and serving MUSH, business, and other retail market end users with higher quality services using SWIFT.

**Table 8. SWIFT Short Term Operating Income Decomposition, 2020-2030 (share in total)**

	Residential	MUSH	Other
<b>Average</b>	<b>0.56</b>	<b>0.21</b>	<b>0.24</b>

**4. Assess the risk and benefits of the proposed governance structure in the business case, including maintenance of an ongoing “equity position” by the SWIFT, Inc., in the fibre optic infrastructure ownership.**

62. Governance structure: The SWIFT governance structure is designed following the guiding principles set out by WOWC relating to a standards-based architecture and transparency. Specifically, the business plan proposes to use the standard Enhanced Telecom Operations Map (eTom) framework for defining and delineating the complex set of business processes undertaken by a variety of service providers that are expected to participate in the SWIFT ecosystem.<sup>44</sup> This approach is sufficiently flexible for coordinating the operations of multiple service providers on a single physical platform, serving different end users with distinct demands, and is consistent with international standards for organizing infrastructure sharing arrangements in the telecom industry. The eTom framework should be familiar and transparent to both incumbents and potential entrants that choose to help WOWC deploy, operate, and generate traffic for SWIFT with their own commitments.
63. Equity: Maintaining an “equity position” by SWIFT Inc. in the Regional network has limited downside risk as the project does not involve debt financing. However, as a long term infrastructure project in an industry that is subject to technological change and cost reductions, maintaining an equity position is critical to monitoring the performance of private sector partners that will receive public funds to extend, upgrade, and operate the Regional network. Furthermore, without the economic development residual that is expected to accrue from SWIFT’s wholesale services the WOWC would have little control over the rate by which private gains from the network improvements are reinvested in promoting last mile network development in higher cost areas where the business case for deploying new technologies and capacity upgrades is weak (or nonexistent). In addition to retaining a public sector voice in the publicly funded initiative, the equity position is necessary for ensuring that the publicly financed network remains “open access” in the longer term and can help constrain exclusionary tendencies of service provider partners selected to participate in deploying and operating SWIFT at the start. The “equity position” will help WOWC solve this dynamic inconsistency problem in the expected behaviour of service providers, which this reviewer believes would be very difficult to adequately address using only contractual obligations.

<sup>44</sup> See <https://www.itu.int/rec/T-REC-M.3050/en>

64. Key dilemma: It is the opinion of this reviewer that maintaining a position that allows WOWC and other stakeholders to monitor and provide strategic direction for SWIFT will be critical to its long term success as a pillar of the Region's digital infrastructure. This is particularly the case in the more optimistic scenario detailed above because the equity stake would provide a much larger payoff to SWIFT in terms of the economic development fee/levy and will accelerate last mile FTTP deployments with the residual. Nevertheless, requiring shared control over key decisions such as third party access rules can reduce the incentives of some of the larger incumbent operators to share existing assets with SWIFT through Indefeasible Right of Use (IRU) agreements at the start of the project. These factors indicate the presence of a trade off between short run cost minimization and long term efficiency considerations, which will have to be assessed and addressed during the procurement and negotiation process with the party (or consortium of operators) that will win the rights to deploy and operate SWIFT. This trade-off will remain relevant for various subsequent strategic procurement decisions SWIFT will have to make in allocating the economic development residual.

**5. Assess the risks and benefits derived from the SWIFT governance structure and proposed "levy" or "residual" and its ability to deliver last mile fibre optic connectivity to all residents and business in Southwestern Ontario versus other potential alternative approaches.**

65. Key findings: This issue has been addressed in detail in the analysis of baseline business model and sensitivity of the SWIFT model to different paths of operational revenue growth in earlier sections. In the baseline case developed by BDO, SWIFT will generate an economic development residual between \$200 and \$300 mil. over its life for last mile fibre optic connectivity. In the more optimistic case where incumbent facilities operators choose to provide SWIFT with dark fibre IRUs to deploy the Metro Ethernet enabled Regional network and with increasing traffic/revenues, the economic development fund can reach nearly \$500 mil. during the life of the project. In the pessimistic case where large incumbent service providers choose not to participate in SWIFT in terms of deployment and demand aggregation from local communities around the SWO, it will still generate a positive rate of return. In this case however, after accounting for SWIFT operational expenses, just under \$100 mil. of residual will be available for subsidizing last mile deployments.

66. The levy and service provider participation: Even under the most optimistic scenario analyzed in this review, the total residual that will be made available will fall well short of the total \$3 bil. that is estimated to be needed to extend connectivity to everyone in the Region. The extent to which available funds can be leveraged to promote private sector investments will depend critically on the willingness of dominant operators to work with SWIFT as supplier of dark fibre IRUs and channel traffic to the publically subsidized network. The SWIFT business model uses a fixed levy of 3.5% for the life of the project. Some degree of flexibility in setting the economic development residual might be desirable as it would enable WOWC/SWIFT Inc. to adjust the plan to market conditions and offers service providers will make in the RFQ/RFP processes in terms of their commitments to SWIFT. In the pessimistic scenario in which large operators choose not to direct their traffic to SWIFT, it might have to start pricing wholesale and potentially

retail services very aggressively in order to generate more traffic/revenues to be allocated to last mile fibre deployments.

67. Alternative policy options: As detailed in Section 1.4 above, there are essentially three options available. The cheapest short term option is to do nothing and hope that market forces will address coverage and capacity gaps in legacy platforms and eventually start to deploy FTTN and FTTP last mile links closer to end users. As detailed in the financial model in Table 2, expected private returns to investing in the type of network extensions and upgrades as SWIFT are positive. However, the expected rate of return for individual operators is lower than what they can generate in lower cost urban centres and from investments in other sub-sectors of the industry. A second possible option for upgrading and extending high capacity fibre links that aggregate traffic from local communities across the Region would be to provide funds to an incumbent facilities based operator to do what SWIFT is designed to do. This approach would have its own long term risks as it might be difficult to monitor what happens to the public subsidies once they have been allocated, could distort competition among service providers, and will not provide WOWC with a residual to reinvest in FTTP deployments in underserved communities. A third option would be to simply channel funds to last mile FTTP deployments by service providers with the best offers, but this will be substantially more expensive than SWIFT and does nothing about the need to upgrade and extend fibre transport networks that serve relatively rural and remote communities in the Region. For a more detailed discussion of expected outcomes from the three basic alternative policy options, please see the analysis in the first part of this report (Section 1.4).
68. Policy options and technological change: Without SWIFT or other public sector initiatives that increase the pace of progress, market forces will inevitably lead to a long term transition from legacy copper, cable, and 3+G mobile to next generation FTTP and 4G platforms that can offer ultra high speed and symmetric connections, with minimum service quality guarantees for end users and content/application providers that require it. Technological innovation is likely to further reduce the costs of fibre and mobile network assets, making them increasingly attractive to deploy to service providers. If recent national and Regional trends represent a good guide of future trends, then Western Ontario is likely to achieve the technological objectives set out in the SWIFT business case/model sometime between 2050 and 2070.<sup>45</sup> According to estimates based on current costs, this will require around \$3 billion in capital expenditures in Western Ontario. SWIFT proposes to employ a combination of strategic public subsidies that promote private sector investments and infrastructure sharing arrangements that reduce the costs of deploying new technologies with the objective of reducing this timeframe to 2040.
69. Value for money: Increasing the rate of technological change in a manner that allows private and public sector end users in Western Ontario to have access to advanced broadband technologies a decade or two earlier than they otherwise would can have significant social and economic benefits for the Region. The key questions in this review

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<sup>45</sup> Please note that even in the very long term, the fixed costs of extending fibre access to rural and remote communities in the Region might be weak and public subsidies in very high cost areas would still be required to achieve WOWC's objective of ubiquitous fibre connectivity.

of the SWIFT proposal are not about the potential benefits of addressing apparent market failures in the provision of a future proof broadband infrastructure for the Region, but the costs and potential risk associated with the SWIFT business model/case strategy for doing so. Engineering assessments of existing gaps and the costs of addressing them indicate that, with limited participation by the private sector, it will cost just under \$300 mil. of public investment to close gaps in the Regions' middle mile and transport networks. Private sector participation by operators of existing facilities is expected to reduce these costs significantly, generating a residual cash flow from the upgraded and extended transport facilities which SWIFT will use to deploy fibre access networks in relatively high cost areas. Over the period of 20-30 years planned in the SWIFT business model/case, this will translate to an approximately 10% public contribution to total capital expenditures required to achieve WOWC technological specification (i.e. \$300 mil. out of \$3 bil. for 100% FTTP access). According to BDO baseline estimates, a further \$800 mil. will accrue to the private sector providers in the Region (Table 1). At the same estimated total cost for FTTP deployment to everyone, regardless of population density, a 1/3 public, 2/3 private, last mile only subsidy approach to the problem would cost at least \$1 bil. in public sector investments. It also may not be as effective because next generation last mile networks require scalable backhaul services that are able to offer ultra fast symmetric connections and minimum service quality guarantees to end user that require them. Consequently, in the case of an access subsidy only policy strategy, additional investments in extending and upgrades to the Regional middle mile and transport facilities that SWIFT is planning will still have to be found.

**6. Assess the similar broadband initiatives profiled in the feasibility study and other models as enumerated by SWIFT Steering Committee from across the country the consultants may have knowledge of and compare and contrast lessons learned with the recommended SWIFT governance and deployment model.**

70. Rural broadband program design: As noted, in 2001 the National Broadband Tasks Force's (NBTF) recommended a national strategy to promote rural broadband connectivity that included a publically subsidized-privately operated open access backbone and last mile access network subsidies. While NBTF's recommendation regarding a national strategy and an open access backbone were not adopted at the federal government, some provinces recognized that access to high-capacity fibre links that aggregate traffic from smaller rural communities is critical for their ability to deploy high speed last mile connectivity. Specifically, Alberta and British Columbia have invested heavily in provisioning an open access rural backbone, but using very different strategies. Although strategies in both provinces were costly, the two provinces that encourage the development of an open access backbone have led the country in terms of both rural broadband access and Internet connectivity speed growth over the past decade.<sup>46</sup>
71. Lessons from Alberta: In the absence of a national strategy and given its financial capacity at the time, Alberta decided to invest directly in a province wide backbone to

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<sup>46</sup> Rajabiun, R., & Middleton, C. A. (2013). Multilevel governance and broadband infrastructure development: Evidence from Canada. *Telecommunications Policy*, 37(9), 702-714. <http://www.sciencedirect.com/science/article/pii/S0308596113000724>

serve public institutions and offer affordable wholesale services in both urban and rural parts of the province. In this process Alberta chose entrants (Bell/Axia), rather than the local incumbent Telus. With time it became increasingly apparent that the decision to exclude the local incumbent limited the ability of rural communities such as Olds Alberta trying to develop their own networks to connect to SuperNet POPs as the incumbent has strong incentives to resist providing third party access to its middle mile facilities.<sup>47</sup> The SWIFT design strategy addresses this problem with placing POPs directly in under-served communities. Affordability of wholesale services on the publically subsidized backbone has also limited its success. The Alberta/Telus experience further highlights the importance of building an inclusive coalition of stakeholders at the deployment stage of the process in order to ensure cooperative business relations in the future. The Alberta case is also instructive in the context of the SWIFT model because it highlights transport access by itself is not sufficient to promote investments in rural communities and last mile subsidies can be needed to promote investments in communities that are too small or high cost to be attractive business propositions for larger service providers.

72. Lessons from BC: The BC government has employed relatively small grants to local communities to develop their own last mile networks. Instead of directly investing in a public backbone, the BC government has entered into a number of long term procurement contracts with Telus that lock in various MUSH sector information technology service provisioning to the incumbent. In return, Telus has agreed to maintain open 150 points-of-presence across the province to third party service providers and to increase speeds that are available in underserved rural communities.<sup>48</sup> While this approach has been relatively successful in improving rural access and connectivity speeds in BC, its costs in terms of the procurement lock-ins for public sector organization are not transparent and might be substantive.<sup>49</sup> This is particularly the case in procuring telecom and information technology services, which are rapidly going through technological change and cost reductions. While WOWC might be tempted to use the procurement power of its members to motivate one or more of the Regional operators in SWO to open up their networks to SWIFT via dark fibre IRUs, it is in the opinion of this reviewer that this approach is not always in the best interest of the MUSH sector. No such a policy has been contemplated in the SWIFT business case, but the lesson from the BC experience with Telus is an important one to remember in deploying SWIFT.
73. Last mile subsidies only: A variety of program design strategies have emerged at the federal, provincial, and local levels that involve using public funds to promote private sector investment in last mile access network facilities.<sup>50</sup> The federal government has primarily focused on last mile subsidies, providing funds to large incumbents via a series

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<sup>47</sup> <http://o-net.ca/>

<sup>48</sup> 2006 Connecting Communities Agreement (CCA) and the 2011 Connecting British Columbia Agreement (CBCA) (Government of British Columbia & TELUS, 2011).

<sup>49</sup> There has not been a review/audit of these costs that has been made public.

<sup>50</sup> For a detailed discussion of different approaches to combining the two components of rural broadband network development see: Rajabiun, R., & Middleton, C. (2013). Rural Broadband Development in Canada's Provinces: An Overview of Policy Approaches. *The Journal of Rural and Community Development*, 8(2), 7-22. <http://www.jrcd.ca/viewarticle.php?id=1140>

of deferral account decisions by the CRTC<sup>51</sup> and a number of smaller targeted subsidy programs over the past few years (e.g. Connecting Rural Canadians). There has been significant concern about the effectiveness of both deferral account decision subsidies and the Connecting Rural Canadians program in delivering rural broadband connectivity, motivating the CRTC to ask in an ongoing hearing about what it should do to service providers that have received the public subsidies to enhance rural broadband and have failed to achieve minimum service quality/speed levels.<sup>52</sup> Importantly, due to the rapid growth in demand for connectivity last mile only rural subsidy programs have become increasingly unsustainable, leading to actual speeds in some rural areas that are substantially lower than the 1.5 Mbps best effort service quality targets in the federal and provincial programs.<sup>53</sup> Scalability of last mile subsidy programs is constrained by the availability of upgraded middle mile and transport facilities, a lesson that is central to the design of the SWIFT deployment strategy.

74. Lessons from Eastern Ontario: Ontario's Rural Connections program similarly targeted subsidies largely to last mile improvements, with mixed results. Ontario appears to have learned from this experience about the importance of addressing underinvestment in both transport and access components of rural broadband networks. In broad term, the design of SWIFT is similar to that of the Eastern Ontario Regional Network (EORN) in that both projects try to balance the need to extend and upgrade transport facilities with last mile subsidies to upgrade and increase network connectivity speeds. The WOWC has had the benefit of time in developing the SWIFT model relative to EORN, designing it as an integrated business plan that retains part of the value added from extending and upgrading the Regions' transport facilities to fund last mile FTTP deployments in areas where the business case for doing so is limited. SWIFT is also distinct as it plans to provide subsidies only to deploying last mile fibre networks, rather than in upgrades to legacy copper/DSL platform or fixed wireless.<sup>54</sup> To be able to retain part of the added value from transport infrastructure upgrades and to keep SWIFT open and neutral, its governance model is designed to provide WOWC relatively more control over strategic decisions through its equity in SWIFT Inc. As detailed in the financial analysis in the first

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<sup>51</sup> Telecom Decisions CRTC 2010-637, 638, and 639.

<sup>52</sup> Telecom Notice of Consultation CRTC 2015-134. <http://www.crtc.gc.ca/eng/archive/2015/2015-134.htm>

<sup>53</sup> Due to a lack of additional investments to meet growing demand, some rural operators are also imposing very restrictive data caps and other form of usage limits on end users: See: <http://www.cbc.ca/news/canada/nova-scotia/eastlink-internet-cap-causes-worries-for-rural-customers-1.3140795>

<sup>54</sup> It is worth noting that this approach is the SWIFT design is consistent with the position adopted by the CRTC in its recent wholesale access decision, Telecom Decision 2015-326, paragraph 126: "An important consideration relates to the availability of substitutes for retail Internet access services provisioned over wireline facilities. In the Commission's view, most consumers have retail Internet usage and speed requirements that can only be served through wireline services, thereby limiting consumers' viable options. Fixed wireless and satellite-based services are mainly options in rural or high-cost serving areas, where wireline Internet access is limited or not available. These services typically have limited bandwidth capacity and higher prices compared to retail wireline services and, as such, are generally not effective substitutes. Although mobile wireless services support retail Internet access, the higher prices for data usage over mobile wireless networks limit their substitutability - the speeds, prices, quality, reliability, and capacity of broadband over wireline facilities are far superior to those available over wireless facilities at the present time, and this will likely continue into the foreseeable future."

part of this document, SWIFT is designed not to compete directly with incumbent service providers and to provide them with a substantial rate of return on their participation in the project. Also in contrast to EORN where much of the funding was allocated to the incumbent Bell, SWIFT organizational model provides more opportunities for different service providers to participate in deploying and operating the Regional backbone, aggregation and access networks. However, it should be noted that sometimes it might be more cost effective to work only with one major private partner as one-time procurement event. Whether one or many partners are desirable in deploying SWIFT will depend on offers they will provide as part of the ongoing procurement cycles contemplated during the initial and recurring RFQ/RFP processes.

75. Policy innovation: The impetus in the SWIFT deployment and governance models to retain part of the value added from upgrades to the Regions' transport facilities and use them to subsidize last mile FTTP deployments makes it unique relative to previous rural broadband deployment projects in Canada. The baseline financial estimates developed by BDO and the sensitivity analysis presented in the review document that this novel approach is likely to be sustainable and generate a stream of residual cash flows into the economic development fund that will be used to promote last mile FTTP deployments. Over the life of the project the level of potential residual can vary significantly from \$100 mil. in the most pessimistic "non-cooperative" scenario to \$500 mil. in the optimistic "cooperative" scenario in which large service providers choose to work with SWIFT and direct their residential and mobile traffic to the Regional network.

**7. Assess the business model/case for how SWIFT will incorporate and/or complement existing broadband infrastructure and respond to potential market competition from non-participating telecom service providers.**

76. Incorporating existing facilities: The SWIFT Feasibility Study involved a detailed analysis of existing facilities and consultations with service provider to better understand their needs. Although some operators provided SWIFT with information about the extent and state of their networks, others did not. Consequently, there are some uncertainties about the extent of existing fibre facilities that can be incorporated into SWIFT using dark fibre IRU agreements or other mechanisms. This is a very important consideration in the costs of deploying SWIFT. The business case estimates that there may be an additional \$50 to \$70 mil. in savings to the fixed capital expenditures required for deploying SWIFT. Since it is cheaper to use dark fibre IRU than building new plants, SWIFT's plan is to minimize deployment costs where fibre of sufficient quality is available. Therefore, it is well designed to complement existing facilities and to provide service providers in the Region with an attractive return for sharing any excess fibre capacity they might have. Nevertheless, it is important to note that the potential savings from incorporating existing facilities are limited due to remaining gaps in fibre coverage and the need for new builds. Of the total of around \$290 mil. in fixed capital expenditures planned for core network and transport facilities in SWIFT, new fibre and equipment deployments make up around \$260 mil. of the costs.<sup>55</sup> In the best case scenario that this can be reduced by another \$50 mil. in IRUs and other facilities contributions from partner

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<sup>55</sup> Table 13, SWIFT business case.

service providers, SWIFT would be able to start funding last mile FTTP deployments as its network POPs become operational.

77. Impact of CRTC wholesale wireline decision: After a multiyear consultation process, the CRTC has recently issued its decision on the application of essential facilities obligations to fibre access and transport facilities.<sup>56</sup> While the Commission extended third party access obligations to FTTP deployments, it did not impose them on fibre transport or dark fibre. This decision was based on the determination that transport facilities are duplicable, a finding that might be correct with respect to urban areas where the fixed cost of deploying multiple FTTN and middle mile facilities can be spread across a large number of end users. In rural areas such as SWO, investing in too many duplicate transport facilities reduces their reach into higher cost communities and limits the incentive of operators to upgrade them. The fact that service providers readily admit to the need to upgrade their existing networks in the Region to Metro Ethernet standards proposed by WOWC/SWIFT lends support to this hypothesis. The reluctance of the CRTC to incorporate fibre transport and dark fibre assets into the essential facilities framework could increase the cost of procuring IRUs from incumbent operators during the SWIFT deployment stage. The recent decision by CRTC further underscores the need for provincial, regional, and local solutions to extending high capacity and scalable fibre links into communities where the business case for doing so is weak (or nonexistent). SWIFT essentially tries to fill the gap created by the lack of federal regulatory obligations with its open access and carrier neutrality principles. In contrast to legal mandate that obliges operators of essential transport facilities to interconnect with third parties at a reasonable price, SWIFT will pay service providers to motivate them to share excess capacity they might have and to invest in extensions and upgrades the Region requires.
78. Non-participating service providers: The more optimistic scenario analyzed in the sensitivity analysis above involved a world in which incumbent service providers choose to take advantage of the higher quality/lower cost aggregation and transport facilities that SWIFT will deploy and send it significantly more traffic than predicted in the baseline case developed by BDO. In the most pessimistic case, larger incumbents in the Region choose not to share their excess dark fibre capacity with SWIFT or to send traffic to it. For example, operators with dark fibre that they could lease to SWIFT using IRUs and earn an attractive return may choose not to do so in order to foreclose potential competition. It is in the view of this reviewer that SWIFT should try to minimize the perception that it plans to compete directly with service providers in the retail market in order to alleviate potential concerns by non-participating service providers. As long as the quality of service and prices offered on SWIFT at the wholesale level are more attractive than those on offer by others or cheaper than upgrading ones' own network, it will attract more traffic during the second decade of its operational plan between 2030-2040. The key to doing so will be to reduce the perceived threat that SWIFT aims to compete in the retail markets and will primarily offer high quality/low cost wholesale services to both participating and non-participating service providers in a competitively neutral manner throughout the Region.

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<sup>56</sup> Telecom Regulatory Policy Decision CRTC 2015-326. Available at: <http://www.crtc.gc.ca/eng/archive/2015/2015-326.htm>

**8. Assess the marketing outreach and engagement plan to ensure that the SWIFT proposal has sufficient support from telecom service providers, public sector entities, and other potential users.**

79. Marketing plan: In order to mitigate the risk of a slow take up rate, SWIFT has developed a detailed marketing plan and included it in the cost estimates for the deployment and operational phases of the project. In addition to the overview provided in the SWIFT business plan, this reviewer has been provided with a Marketing Calendar for first 5 year deployment phase of the project. The marketing plan involves a wide range of marketing and stakeholder engagement activities, including personal outreach, seminars, community events, website and working with old and new media to promote demand. Although there is no breakdown of specific groups that are to be targeted, the scope of the marketing plan appears to be substantive.
80. Strategic risks: Although activities such as personal and community engagements with service providers and large users will be critical for generating demand as SWIFT becomes operational, this reviewer is of the opinion that very aggressive marketing to a broader range of incumbent service providers' customers in the early days of the project can be counterproductive. As detailed in the sensitivity analysis above, the best scenario for SWIFT will only emerge if a cooperative solution is reached that motivates larger incumbent operators to direct more of their retail market traffic to the publically subsidized middle mile/transport network. If marketing to existing customers of incumbents is too aggressive at the start, some of them may choose not to cooperate with SWIFT in terms of both dark fibre IRU agreements and future commitments to using SWIFT. Even though most larger operators in the Region appear to currently support the SWIFT initiatives, maximizing the range of potential private sector partners will be critical for achieving WOWC's objective of ubiquitous FTTP diffusion by 2040. Consequently, it is the opinion of this reviewer that some of the broader marketing and media activities in the first few years of SWIFT could be scaled back in order to minimize the threat that some service providers might perceive from the development of an open access Regional backbone. If the attractive returns to private participation and opportunity to serve their end users with higher quality services at a lower cost are not sufficient to generate enough demand, then SWIFT can start to escalate its end user marketing strategy in order to increase the economic development residual that will be available for cross-subsidizing further fibre deployments in higher cost area of the Region.<sup>57</sup>
81. Flexibility: Given the finding that the best case scenario of SWIFT is feasible, it is the opinion of this reviewer that it should retain some flexibility in its market strategy at the start of the process in order not to generate an anticompetitive backlash from large incumbents. Responses to RFQ/RFP proposals and value of offers made by potential private partners in SWIFT should provide a clear signal about their strategic direction. If it seems there is substantial support in terms of IRUs and commitments to direct traffic to SWIFT in the future, then a scaled back marketing strategy can provide additional long

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<sup>57</sup> For example by directly targeting MUSH users, large enterprises, and smaller service providers.

term operational savings to reinvest back into the Regional network. In the worse case scenario in which large incumbents choose not make attractive offers to WOWC/SWIFT Inc. then an aggressive marketing strategy that educates stakeholders and users in the Region about the benefits of next generation fibre networks might help convince them to act in a more cooperative manner.

**9. Assess the impact of the OPS/MGS procurement for GONet on the SWIFT model and how these projects may best complement each other.**

82. Although this reviewer is aware the OPS/MGS uses Telus for GONet, there is little public information available on the details of OPS/MGS future procurement strategy. Understanding what range and quality of service OPS/MGS expects from the GONet provider would be required to answer this question in detail. Nevertheless, it is in the opinion of the reviewer that SWIFT will complement GONet, regardless of who is supplying it, by providing a Metro Ethernet backbone that is not currently available in many parts of the Region. Given that Telus does not have significant network assets in Western Ontario, it is likely providing GONet services using facilities of other parties. SWIFT can enhance the ability of the GONet supplier to offer OPS/MGS higher quality services and quality of service guarantees that are simply not possible given the current state of the network detailed in the SWIFT Feasibility Study. Once it has been deployed, SWIFT provider may directly engage with the GONet supplier OPS/MGS selects to provide it with wholesale services across in SWO. In the best case scenario for SWIFT where large facilities based operators in the Region choose to “cooperate” there may not be any need for SWIFT to directly engage with GONet supplier. Given that potential GONet revenues are likely to be very small relative to the wholesale market that connects residential and business users to the Internet, there is a risk in engaging directly with GONet supplier that may not be worth the potential return for SWIFT (i.e. in terms of the perceived threat that this interaction can have from the perspective of facilities providers in the Region that are handling GONet traffic for the supplier OPS/MGS selects in the future).
83. In general: For serving OPS/MGS users, as well as the broader public sector, the proposed technical standards of the SWIFT infrastructure will have clear advantages relative to what is currently available in terms of improved service quality in SWO. The Metro Ethernet standard in SWIFT will also enable public sector entities to expand the range of applications they can deploy in a reliable manner because it will be capable of offering minimum service quality guarantees that are not currently available on legacy networks and standards. This can have profound implications, not just in terms of cost and quality, but also in the range of applications that can be employed to enhance the effectiveness of delivering public services (e.g. emergency response, e-health, Internet of Things applications, etc.). Therefore, it is in the opinion of this reviewer that provincial support for SWIFT will complement efforts to promote the use of advanced Internet applications to deliver public services more effectively at a lower cost.

## **10. Assess the pros and cons of delivering the SWIFT project through Infrastructure Ontario's Alternative Financing and Procurement model (P3 model).**

84. Ontario standards: To evaluate if the proposed project meets Infrastructure Ontario's Alternative Financing and Procurement model, this author has tried to better understand the Ontario standards for screening projects that are designed using the P3 model to allocate the risk to private sector partners. A review of Infrastructure Ontario documentation does not provide concrete guidelines for assessing when the P3 model should be used and when the traditional financing approach remains appropriate. It is the impression of this reviewer that the Ontario standards remain in flux, particularly given the debate surrounding a recent audit of the program. In terms of the previous experience in Canada and in Ontario with funding regional broadband development initiatives such as EORN, there is little precedent for using the Alternative Financing and Procurement model in the case of SWIFT. More generally, the pace of technological change and the impetus in SWIFT to generate a residual cash flow for funding last mile FTTP deployments make it a relatively unattractive candidate for the Ontario P3 model.
85. Federal screen: The SWIFT business case/model provides the summary of a more detailed P3 screen with respect to federal standards for financing infrastructure projects using this alternative model. This reviewer has analyzed the SWIFT federal P3 screen and concurs with its finding that the initiative should be funded using the traditional infrastructure financing model.
86. Pros and cons of P3 for SWIFT: The main advantage of using the alternative model for SWIFT would be to allocate more of the risks of its deployment and operation to the private sector than planned under the current SWIFT business model design. In theory, by directly subsidizing one of the large facilities based operators in SWO to upgrade and extend its network to standards specified by WOWC, all the deployment and operational risks of the project would be allocated to that private partner. In the short term this approach is likely to cost less than SWIFT for reaching the same coverage and technical standards. However, it would inevitably distort competition and generate significant resentment by other facilities and service providers who are also currently serving residents and businesses in the Region. More importantly in terms of dynamic efficiency of the arrangement, after subsidies have been allocated and the higher quality network has been deployed with public funds, the hypothetical private partner would have strong economic incentives to restrict access and service quality to third parties that might compete with it in the retail market. CRTC essential facilities regulations would not oblige this incumbent to provide third parties access. Long term contracts may be used to try to keep up service standards, openness, and competitive neutrality of the operating partner in a P3 arrangement for SWIFT. However, it is in the opinion of this reviewer that with incomplete contracting and inherent technological uncertainties that can have an influence on costs, this will be a very risky strategy for WOWC, Ontario, and Federal agencies to pursue. The SWIFT economic development residual required to allocate part of the value added from the infrastructure upgrades to last mile FTTP deployment would also be put at risk in the absence of some "equity" that provides for a measure of public

control by WOWC/SWIFT Inc. over key strategic decisions that will have to be made in the future (e.g. wholesale pricing, further fibre investments, rules of third party access, etc). As detailed in the first part of this review, rather attractive rates of return for participation in SWIFT on offer for potential private sector partners may be sufficient to convince them to take on most of the operational risks of the project without the need to resort to the alternative P3 model and be exposed to the particular risks it involves for the public sector. To ensure long term success of the project in terms of last mile FTTP deployments in higher cost areas of the Region, WOWC/SWIFT Inc. are advised to retain control and closely monitor performance of private partners for at least the first 15 to 20 years of the project's operational life.

\*\*\*\*End of Document\*\*\*\*