



CANARIE ANNUAL REPORT

for

Innovation, Science and Economic Development (ISED) Canada

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1. Overview

Context for CANARIE

CANARIE's role in Canada's innovation ecosystem was set out in its 1993 Articles of Incorporation and reiterated in its 2013 Articles of Continuance: *to contribute to Canadian competitiveness in all sectors of the economy, to wealth and job creation and to the quality of life of Canadians.*

Throughout its history, CANARIE has evolved to support Canadian competitiveness through the development and deployment of digital technology for Canada's research, education and innovation communities. Over the course of its 29-year history, CANARIE has helped shape Canada's digital landscape by leading, among others, the following initiatives:

- laying the groundwork, with provincial partner networks, for the first commercial Internet in Canada;
- incubating the Internet Registration Authority in Canada, now known as CIRA;
- supporting hundreds of Canadian businesses, educational and health organizations in their transition to digital models and processes via the Technology Development, Technology Diffusion Program; Technology Applications Development Program; and E-business, E-learning and E-health Programs;
- working with global peers to align international research and education infrastructures to support globally collaborative research, now formalized via the Global Network Advancement Group (GNA-G);
- developing the grid certificate authority in Canada that provides secure access to data generated from the Large Hadron Collider and other advanced digital technologies;
- supporting the uptake of cloud technology by Small and Medium-sized Enterprises (SMEs) in Canada;
- identifying gaps in research software and championing the development of powerful research software tools to efficiently enable researchers across many disciplines to accelerate discovery, now transitioned to the Digital Research Alliance of Canada as part of the Digital Research Infrastructure (DRI) Strategy; and
- supporting Research Data Canada to align research data activities within Canada and internationally, now transitioned to the Digital Research Alliance of Canada as part of the DRI Strategy.

This continual evolution of CANARIE and its activities can be seen in the tremendous advances in aligning the sector on a highly coordinated approach to enhancing cybersecurity which has most recently led to the integration of CanSSOC (the Canadian Shared Security Operations Centre) into CANARIE, which was announced in May 2022, and will be reported on in future Annual Reports. Initial steps toward this vision will enable coordination among local institutional cybersecurity specialists, together with regional and national cybersecurity experts, to detect and respond to evolving cybersecurity threats.

CANARIE's activities serve to continually advance Canada's digital infrastructure for research, education, and innovation so that Canadians are positioned to compete in the global knowledge economy. More detailed information on current activities may be found below.

Executive Summary

CANARIE's Contribution Agreement for 2020-2024 with Innovation, Science and Economic Development (ISED) Canada requires the organization to "provide to the Minister, by July 31 of each Fiscal Year, beginning in 2021, an Annual Report approved by the Board, in both official languages relating to the previous Fiscal Year." This report addresses those requirements.

Over the past year, CANARIE has executed on all eligible activities outlined in its 2021-2022 Business Plan. These eligible activities align with CANARIE's core purpose: **the advancement of Canada's knowledge and innovation infrastructure**, and its mission: **to design and deliver digital infrastructure, and drive its adoption for research, education, and innovation**. At a high level, through its programs, CANARIE works towards achieving these objectives by:

- overseeing the ongoing evolution of Canada's National Research and Education Network (NREN);
- supporting a collaborative approach to improving cybersecurity in the research and education ecosystem;
- championing the development of research software, research data management, and collaboration tools; and
- providing users in the private sector with access to advanced technologies to accelerate their time to market.

Together, these activities align to deliver more integrated and accessible digital research infrastructure, tools, and services. Beyond these activities, CANARIE also champions the evolution of Canada's digital research infrastructure (DRI) and continues to partner with the Digital Research Alliance of Canada (the Alliance) in support of the Government of Canada's DRI Strategy.

Network Evolution

As the primary role of the CANARIE network is to provide interprovincial and international connectivity for Canada's National Research and Education Network (NREN), CANARIE works closely with provincial and territorial network partners that build and operate regional networks in their province or territory to co-deliver services to the Canadian research and education community. Through a governance structure which is led by the NREN Governance Committee, this successful federal/provincial partnership manages the evolution of the NREN to ensure that Canada's research, education, and innovation communities can access nationally and globally distributed data, tools, and colleagues.

CANARIE understands the impact of increasing amounts of digital data on research, education, and innovation, and has evolved the national backbone network to ensure Canada's research and education community can continue to access and leverage these data to support world-class research. Network traffic continues to grow as the research community responds to the challenges presented by the COVID-19 pandemic, and traffic on the network grew by 47% in FY22 over FY21 levels.

Given the foundational nature of the network to a wide range of research, education, and innovation activities, CANARIE focuses on both its core network and the ongoing strategic evolution of Canada's NREN, in order to meet the evolving needs of the research community in Canada. Of note is the on-going execution of the 2020-2024 NREN Strategic Plan, which supports the federal-provincial partnership that is the cornerstone of Canada's NREN.

CANARIE continues to represent Canada in the international advanced networking community, participating actively in the NREN CEO Forum - including chairing the Forum's Financial Benchmarking Working Group, and participating in the Global Marketing Communications Group (SIG-Marcomms) and the Global R&E Network Advancement Group (GNA-G). CANARIE's participation in these and other communities ensures that Canada's digital research infrastructure evolves to enable Canada's research and education communities to participate and lead globally collaborative research.

CANARIE supports mission-critical research at a range of government laboratories, assisting Shared Services Canada (SSC) in network and network-based services planning and execution. As well, a CANARIE representative sits on the Government of Canada's Canadian Forum for Digital Infrastructure Resilience (CFDIR) to work with industry and government towards identifying existing, and anticipating future, resilience issues and then finding solutions. CANARIE is increasingly called upon to provide objective advice to government partners regarding new technology initiatives and opportunities for Canada.

Collaboration Tools

Under the Canadian Access Federation (CAF) service umbrella, CANARIE enables Canadian students, faculty, and staff to securely access remote resources using digital identities from their home institutions. This service enables seamless access to protected online content, via Federated Identity Management (FIM), and to campus Wi-Fi networks through *eduroam*. CANARIE continues to see significant growth in the use of these services, and identity management is increasingly seen as a key pillar of institutions' cybersecurity posture.

Cybersecurity

Cybersecurity is a significant and growing concern for all sectors, but institutions in the research and education sector operate in a uniquely complex environment: large and mobile user bases; policies that support "bring-your-own device" to campus; and significant amounts of Information Technology (IT) infrastructure outside the purview of central IT. These organizations also hold a large amount of data of value to cybercriminals, including personal data of staff, faculty, and students, as well as commercially valuable intellectual property developed by academic researchers often in collaboration with industrial and/or international partners.

CANARIE is working to help secure this sector through the creation and implementation of its Cybersecurity Initiatives Program (CIP) and the establishment of the Cybersecurity Advisory Committee (CAC) and its standing committees, with representation from a cross-section of Canada's research and education institutions and supporting organizations, to provide insights on the priorities, realities, and challenges of the sector and advise CANARIE on proposed CIP initiatives.

Research Software

Recognizing that software is essential infrastructure to support access to data and its computation, CANARIE has invested in research software tools since 2007. CANARIE's long-term vision is to enable software reuse and software development best practices within Canada's research community. Through its Research Software Program, CANARIE has spearheaded the development of 146 reusable software tools and is now supporting the onboarding of new researchers onto existing research software tools.

To maximize the impact of these investments, CANARIE has taken steps to ensure these software tools are available to all researchers.

CANARIE's most recent funding calls have added support for the modification and maintenance of existing research software platforms to meet the needs of research teams and funded local software expertise on campuses to enable and support the use of research software tools. CANARIE actively worked with the Alliance over the course of FY21 and FY22 to seamlessly transfer responsibility for the Research Software program to the Alliance in an effort to ensure continuity for the community; to support this seamless transition, CANARIE will continue to fund the maintenance portions of its projects through to the end of FY23.

Research Data Management

Beginning in 2014, CANARIE provided funding for Research Data Canada (RDC) and its programs, enabling opportunities for greater integration of the elements of digital research infrastructure. More recently, CANARIE launched a Research Data Management program to fund the development of national data management tools and software. The program funded 14 research teams to develop software components and tools to enable Canadian researchers to adopt best practices in managing data resulting from scientific research. With the transition of research data management activities to the Alliance, FY22 was the last year that CANARIE supported these programs. CANARIE actively worked with the Alliance over the course of FY21 and FY22 to seamlessly transfer responsibility for the Research Data Management to the Alliance in an effort to ensure continuity for the community, and this transition is now complete.

Private Sector Innovation

CANARIE enables users in the private sector to leverage advanced digital infrastructure to accelerate the commercialization process. The DAIR program (formerly the Digital Accelerator for Innovation and Research) Program has supported over 1,750 small and medium-sized enterprises (SMEs) to develop and test a range of novel Information and Communications Technology (ICT) products and services. The DAIR Program provides SMEs with an opportunity to benefit from the scale and agility of cloud resources (computing and storage resources located in distributed data centres). Deploying these advanced technologies provides businesses with an opportunity to test and develop innovative products at no cost, which both speeds time to market and reduces development costs. Further, the opportunity to deploy cloud technologies in early product development is a powerful demonstration of how these technologies can transform traditional business models and serves to further incent businesses in adopting cloud technologies as part of their long-term business strategy.

Additionally, to support the use of other emerging technologies that can leverage cloud resources, CANARIE launched the DAIR "BoosterPacks" initiative. BoosterPacks are curated packages of resources on a specific emerging technology, available to SMEs in Canada at no cost, built by experienced Canadian businesses. These experts – "BoosterPack Builders" – curate their knowledge and expertise to help others understand and overcome challenges in key emerging technologies such as machine learning, IoT, blockchain and cybersecurity. The goal of each BoosterPack is to help SMEs get to market faster by benefiting from some of the tips and resources that helped the Builders, while avoiding some of their pitfalls.

CANARIE continues to promote the use of DAIR and the transformative power of cloud technologies to the SME community through a range of media, and case studies, published on the CANARIE website. This content highlights businesses' use of DAIR and the tangible competitive value delivered using cloud infrastructures. Additionally, CANARIE's Innovation and Commercialization Committee, helps drive the evolution of its private sector activities.

To advance Canada's leadership in networking technology, CANARIE is a founding partner in the Centre of Excellence in Next Generation Networks (CENGN). CENGN is a consortium of industry, academic, and research leaders who are pooling their expertise and equipment to enable SMEs to test new products at scale, with the goal of accelerating the commercialization of Canadian networking technologies in the global marketplace. CANARIE continues to provide connections and support to stakeholders in the private and public sectors that underpin CENGN.

Partnerships and Community Engagement

CANARIE continues to engage with a broad range of stakeholders to ensure its activities align with changing community needs, including our Canadian NREN Partners, the Digital Research Alliance of Canada (the Alliance), the CFI, Compute Canada, Universities Canada, the U15, CUCCIO, CAUBO, Colleges and Institutes Canada, Polytechnics Canada, Fédération des cégeps, Genome Canada, and the granting councils. CANARIE has worked closely with the Alliance to manage the transition of Research Software and Research Data Management to them, and the two organizations are committed to working together to support the Government of Canada's DRI Strategy, and to provide Canadian researchers with world-class tools to support their research workflow.

CANARIE's role in the digital research infrastructure landscape continues to solidify through premier events such as the CANARIE National Summit, which took place as a virtual event in the fall of 2021; speaking opportunities for CANARIE staff at provincial, national, and international events and conferences; through ongoing updates to its corporate website and social media platforms; and with outreach/educational materials.

On behalf of the Board of Directors, CANARIE would like to thank the Minister and officials at Innovation, Science and Economic Development Canada, for their continued support and confidence in CANARIE. CANARIE looks forward to providing Canada's research, education, and innovation communities in the public and private sectors with world-class digital research infrastructure, so that Canada can grow its innovation capacity and compete and win in the global digital economy.

2. Statement of Eligible Activities for 2021-22 and Report on the Extent to Which CANARIE Met the Expected Results

Throughout its 2020-2024 mandate period, CANARIE will support the Government of Canada's DRI Strategy. CANARIE's activities in the second year of this mandate were aligned with the strategic goal to "ensure that Canadian researchers have the digital tools they need to support scientific excellence."¹

CANARIE's three eligible activities in the 2021-2022 Business Plan are detailed below. A report on the extent to which each eligible activity was achieved is contained in the paragraphs following.

2.1 Network Operations

Evolve/extend Canada's world-leading collaboration network

To address the evolving needs of users in research, education, and innovation communities, CANARIE will enable a pan-Canadian collaboration capability through a world-leading high-performance network and network-based services.

CANARIE Network:

To evolve and expand the CANARIE network in a flexible and cost-effective manner over the long-term, CANARIE's vision is to deploy fibre, where economical, from coast-to-coast across Canada. In high-use, high-growth network corridors, CANARIE has purchased long term use of fibre and therefore has the flexibility to add capacity and deploy transformative technologies at a low incremental cost. To further build out the network, CANARIE uses leased services from suppliers where the traffic demand does not warrant dedicated fibre, for service resiliency, or when fibre acquisition is cost prohibitive.

Deployment of additional network capacity to support traffic growth

CANARIE is in the process of augmenting current carrier wavelength service capacity to improve redundant network paths across the network, to provide additional capacity and resiliency to the R&E backbone. Additionally, CANARIE completed a refresh of network optical equipment in Western Canada, and planning is underway for a multi-year project to do the same in Central Canada

The top five CANARIE network users in 2021-22 were:

Simon Fraser University; TRIUMF; SHARCNET; University of Victoria; University of Toronto

Deployment of additional network capacity to support Northern connectivity

In FY22, CANARIE worked with Nunavut Arctic College (NAC) to investigate connectivity options to the NREN, and will continue this collaboration with NAC moving forward, identifying appropriate connectivity to support their unique requirements.

Additionally, CANARIE engaged with Aurora College in assessing the suitability of their NREN

¹ <https://www.ic.gc.ca/eic/site/136.nsf/eng/home>
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connection, but the assessment indicated that the existing network infrastructure would not currently benefit from additional network capacity. CANARIE will continue these discussions with Aurora College in FY23 and evaluate a proper timing to increase network capacity.

Improvement of network security reporting, monitoring, and measurement system

CANARIE continues to improve data collection for network monitoring, with the custom data collection scripts developed in FY22 saving network monitoring data in flexible data formats that can be easily retrieved and transformed into alerts and reports. This allows the production of reports on daily, monthly, and quarterly basis. The main objectives of these updated data collection processes include streamlining data collection, maintaining data consistency against network changes, and keeping historical data for a longer period.

Deployment of Software Networking Applications

CANARIE is in the process of developing a new framework to allow automated operational processes, which is scheduled for completion in FY23. The first task is to deploy a network information tool called NETBOX, to track and maintain network asset information. The operations team will continue NETBOX development and network information data collection in FY23.

Deployment of support tools accessible through the user portal

CANARIE continues to enhance its network tools to help support internal operations, as well as the network operations of the NREN Partners. In FY22, CANARIE modernized the network traffic maps, which assess network traffic utilization and historical trends, using newer web technologies and new collection methodology. CANARIE also started the development of a new Internet Route Registry (IRR) tool, to help NREN operators maintain IP addresses information, thereby ensuring IP addresses are propagated through the NREN networks properly.

Improved commercial cloud support

CANARIE continues the improvement of commercial cloud connectivity. In FY22, CANARIE established an additional direct connection with Amazon Web Service (AWS). This direct connection gives CANARIE the ability to increase network speed easily to meet user demand. In addition, CANARIE upgraded Microsoft direct connections in Vancouver, Toronto, and Montreal from 10Gbps to 100Gbps speed, a 10-fold increase of network capacity. As institutions' use of cloud services evolve, these 100Gbps connections will be crucial to support traffic growth in the coming years.

Improvement of the Global Research and Education Network (GREN) Map

CANARIE continued development of the GREN Map, building on the pilot implementation of the map which featured data from the Canadian NREN, and international NRENs RNP and GÉANT, and demonstrated at the international TNC conference. The GREN Map will be the first real-time visual of the full reach of the GREN, down to the institutional level, to provide funders and institutions a better understanding of the value of connecting to their local NREN. The full Version 1 release of the GREN Map is expected in FY23.

Adoption of NIST Risk Management Methodology for internal network Threat Risk Assessment

CANARIE adopted the NIST Risk Management Methodology for internal purposes during FY21 and Annual Report 2022

continued its utilization during FY22. This aligns with the use of the NIST Cybersecurity Framework in CANARIE's external funded services, such as the National Cybersecurity Assessment.

Operate the Distributed Denial of Service (DDoS) detection system dedicated to the CANARIE network and actively collaborate with NREN Partners on the validation of incident data and delivery of mitigation options

CANARIE's DDoS system has been in use for two years and has already identified and helped protect against several noticeable DDoS events. The NREN developed two DDoS related documents during FY22: the first document describes communication process for reporting DDoS events between NREN Partners; and the second outlines mitigation processes. The two documents will help the NREN Partners combat DDoS attacks more effectively. In addition, the NREN Partners developed a common approach to reporting DDoS events, leading to the regular production of DDoS activity reports.

Other Achievements – Network:

International Partnerships – NREN CEO Forum

CANARIE continues to participate as a member of the Global NREN CEO Forum. This Forum brings together the CEOs of 17 national research and education networks to collaborate on the global evolution of critical digital infrastructures and associated services. Despite a lack of face-to-face meetings during the pandemic, the Forum continued to meet regularly on a virtual basis. The Forum provides an opportunity for Canadian representation on a broad range of global research and education initiatives that include networking evolution, shared marketing collateral, and identity management. The first post-pandemic face-to-face meeting of the Forum is scheduled for July 2022.

International Partnerships – Global Network Advancement Group (GNA-G)

CANARIE was actively involved in the Global Network Architecture (GNA) initiative with the goal of defining a reference architecture and creating a roadmap for both national and regional research and education networks to support research more seamlessly. This group has evolved into the Global Network Advancement Group (GNA-G), to provide a broader effort that will establish more capable, predictable, cost-effective, and resilient next-generation global connectivity for research and education. In support of the model being advanced by GNA-G, CANARIE operates a global R&E exchange point, MOXY, in Montreal, to support international data flows. Additionally, CANARIE's CEO serves as the Executive Liaison between the GNA-G leads and CEOs of R&E networks globally.

Canadian Access Federation:

CANARIE works with stakeholder groups to identify demand for network services and collaborates with national and global partners to deliver them. Currently, CANARIE is the national operator of the Canadian Access Federation (CAF), which enables Canadian students, faculty, and staff at participating institutions to access protected online content using their home institution digital identities through its Federated Identity Management (FIM) service. Institutions participating in CAF also benefit from the *eduroam* service, which provides students, faculty, and staff with secure access to Wi-Fi in 106 territories worldwide by using their home institution's credentials at the participating site they are visiting.

Increased adoption of CAF

In 2021-22, the total number of CAF participants increased to 211. CANARIE continues to work with our NREN Partners to find new ways to support CAF uptake.

Increased number of eduroam log-ins per year

Eduroam registered 179 million logs-in in FY22, more than double the number forecast at the start of the year. CANARIE expects to see continued growth in both *eduroam* and *eduroam* Visitor Access (eVa) usage as more students and faculty return to campuses following the COVID-19 pandemic.

Increased number of projects to upgrade the capacity/capability of the federation; and Increased number of interfaces, applications, and tools available to support CAF services

During FY22, CANARIE completed a proof of concept to integrate Multi-Factor Authentication (MFA) into Federated Identity Management, to further increase the security of the service. The results of the proof of concept will provide guidance to fully operationalize MFA within the federation.

Other Achievements – CAF:

eduroam in Non-Campus Environments

CANARIE continues to work to increase the number of non-R&E locations (e.g., libraries, municipal offices and arenas, and airports) that are broadcasting *eduroam*, to increase the service's reach and its value to the community. During FY22, new *eduroam* deployments include [Prince George Airport in British Columbia](#) and [the City of Calgary's Municipal Building](#).

Cybersecurity Initiatives Program (CIP):

In response to the need identified by Canada's research and education community for national coordination and alignment of cybersecurity efforts, CANARIE invests in initiatives that will strengthen the whole sector with advanced technologies, improved processes, and broadened expertise. These initiatives are primarily accessible by eligible organizations through the provincial and territorial partners in Canada's National Research and Education Network (NREN).

Initiatives funded by the CIP will support the evolution of a complementary set of capabilities at all layers - from local to national - which collectively support the goal of enhancing the overall cybersecurity posture of the sector. Funding supports activities that address priorities or gaps with the greatest potential to advance cybersecurity posture across the broadest portion of the ecosystem, and funded initiatives must allow all NREN-connected eligible organizations to participate in and/or benefit from initiatives.

Next set of Cybersecurity initiatives defined

The fourth and fifth initiatives funded under the CIP were approved by CANARIE in October 2021, following recommendation by the Cybersecurity Advisory Committee. The Cybersecurity Benchmarking initiative launched in the fall of 2021, and the National Cybersecurity Assessment will launch during 2022.

DNS Firewall, Intrusion Detection System, and Threat Feed initiatives deployed at eligible organizations

CANARIE, with the support of our NREN Partners, continues to onboard Eligible Organizations to our CIP initiatives with 196 out of 209 having executed an agreement with CANARIE by the end of FY22. Following the launch of DNS Firewall in FY21, Threat Feed and Intrusion Detection System (IDS) were launched respectively in Q1 and Q2 of FY22. By the end of FY22, 148 institutions have adopted DNS Firewall, 140 had adopted Threat Feed, and 121 institutions were utilizing IDS, out of 209 eligible organizations.

First draft of a cybersecurity assessment framework developed

Recognizing that an effective cybersecurity framework requires engagement throughout senior levels of an institution and needs to be viewed as an organizational risk management issue rather than a purely technical problem, CANARIE enhanced collaborations with CAUBO, whose primary audience, Vice Presidents Finance and Administration (VPFA), often have institutional responsibility for risk management, and control budgets for IT investments. CANARIE provided an article on using a framework approach to cybersecurity that was published in CAUBO's University Affairs magazine, and produced a document on using this type of framework to inform cybersecurity investments.

NREN Program:

Canada's National Research and Education Network (NREN) operates on a co-delivery model, as a partnership between CANARIE and provincial/territorial NREN Partners. CANARIE provides interprovincial and international connectivity, while the regional partners provide connections to institutions and organizations within their jurisdictions. Data that travels out of a province or territory traverses CANARIE network links to NREN Partners in other provinces or territories, or internationally via CANARIE links connecting Canada to the rest of the world.

A coherent technical and strategic evolution of the NREN is driven by a vision to ensure that Canadians from coast to coast to coast have a comparable user experience within Canada, and to users of NRENs in other countries. CANARIE's NREN Program enables NREN Partners to increase capacity and reliability of existing equipment and infrastructure; to enable network management (tools and training); and to extend the reach of NREN Partner networks to more institutions.

Completion of second competitive funding call issued to meet NREN Partners' requirements

The second competitive funding call for the NREN program was launched on April 27, 2021. The purpose of this Competitive Funding Call, which provides \$3.3M across 16 projects, is to enable NREN Partners to create, extend, or maintain network infrastructure and/or advanced network capabilities to support collaboration and research both nationally and internationally and to enable increased access to, and use of, the NREN.

Technical audits of funded projects

Four of the six NREN Call 1 projects were completed in FY22, and technical audits will follow.

Increased reliability, capacity, and security on network segments shared by NREN Partners

The NREN Partners continue to work together on the completion of projects to improve network operations and security, such as enabling Resource Public Key Infrastructure (RPKI) on NREN networks. The initial goal of the project is to assist each NREN Partner with ensuring each of their community member networks accessing the NREN have obtained the proper Route Origin Authorizations (ROA) certificates for their IP address spaces as a means of further securing the national network. Each NREN Partner will communicate with their connected institutions on the importance of enabling RPKI on the network and provide help and materials if needed.

Increase NREN security through continuation of the NREN SIEM project

Ten partners in the NREN participated in the NREN SIEM Project, which began with a national joint procurement of a Security Information and Event Management (SIEM) tool at NREN Partners. The project also incorporated the hiring of dedicated Cybersecurity Analysts at NREN Partners, thereby creating a community of security practitioners across the country. This dedicated group of Cybersecurity Analysts work together to protect the NREN community by efficiently leveraging resources and processes, creating a national view of the NREN security posture with local implementation.

Development and launch of projects to enhance security

Following the launch of a Working Group to implement MANRS (Mutually Agreed Norms for Routing Security) across the NREN in FY21, CANARIE and 11 other NREN Partners announced MANRS compliance in November 2021, meaning that more than ninety-nine per cent of organizations connected to the NREN are now connected to a MANRS-compliant network.

Continued progress towards the technical implementation of the Nunavut NREN Partner

In August 2020, CANARIE signed an agreement with Nunavut Arctic College for the college to become the NREN Partner in Nunavut, thereby completing the Canadian NREN. CANARIE continues to support Nunavut Arctic College in the development of their R&E network.

Organization of an NREN Assembly event to foster engagement between NREN Partners

CANARIE facilitated the fourth NREN Assembly in December 2021, bringing together staff from across the NREN. The event provides an opportunity for NREN staff to learn more about what is taking place across the entirety of the NREN, and to develop operational plans and priorities for the coming year.

2.2 Technology Innovation:

Research Software Program:

To address gaps in research infrastructure and leverage existing investments in research software, CANARIE supports the creation of technologies to bring new collaboration capabilities, not previously offered, to the research community. The Research Software program currently focuses on three principles: funding software re-use and adaptation, to minimize development efforts; promoting research software best practices; and supporting long-term software sustainability. These activities are transitioning to the Alliance, in the meantime CANARIE will continue to support maintenance funding for projects in FY23.

Enhanced documented metrics and best practices for the Local Research Software Support Initiative

CANARIE continues to work to identify the most appropriate and useful metrics for the Local Research Software Support Initiative and will share these with the Alliance to ensure the success of Research Software initiatives moving forward. Funding and monitoring of Local Research Software Support Call 1 continued during FY22.

Financial and technical audits of the development portion of funded projects under platform Call 3; and Transition to the maintenance portions of projects funded under platform Call 3

All funded projects completed their technical audits for the development period and were transitioned to maintenance funding.

Canadian Research Software Conference (CRSC) 2021 held and feedback from attendees documented

CRSC 2021 took place as a virtual event in July 2021, and feedback from the event was used to develop the program for CRSC 2022, which will take place as an in-person event in Montreal, May 31-June 1.

Research Data Management:

In response to consistent community feedback that identified the need to coordinate activities in research data management, CANARIE took action and provided funding to support Research Data Canada (RDC) in 2014. RDC's overarching goal was to improve the management of research data in Canada so that it is broadly available to support knowledge creation and innovation. Subsequently, CANARIE launched a Research Data Management (RDM) program in 2017-18 to fund the development of RDM tools. These activities have all transitioned to the Alliance as of the end of FY22.

Execution underway for all approved projects in Research Data Management Call 2; Development and use of RDM services, tools and platforms that enable Canadians to adopt RDM practices and comply with evolving funder policy; and Financial audits of Call 2 funded projects completed as required

All approved RDM Call 2 projects were completed in FY22, and final audits are taking place as required.

Development of an action plan for RDC's outreach efforts, including Canada's National Data Services Framework

The 2022 NDSF Summit took place in March 2022 and was used to highlight the transition of RDM activities to the Alliance.

Development of end-of-project metrics that demonstrate the impact of targeted funding to the RDM community

Metrics relating to RDC, CANARIE'S RDM Program, and CANARIE's support for the Portage Network will be submitted to the Government of Canada in line with CANARIE's Performance Management Framework.

Innovation Fund:

To support technology innovations and community needs identified during its mandate, CANARIE maintains an innovation fund, to test and validate pilot programs that support the research and innovation communities in Canada in line with our agreement with the Government of Canada.

Initial project to be supported is defined

CANARIE formed an internal Working Group to investigate possible projects for the Innovation Fund, which will be formally launched in FY23.

2.3 Private Sector Innovation

CANARIE seeks opportunities to leverage digital infrastructure and tools to facilitate increased use of transformative technologies by private sector enterprises and drive increased innovation and commercialization. CANARIE currently participates in two major initiatives to support ICT sector innovation and commercialization.

DAIR Program:

To leverage CANARIE resources and capabilities in support of private sector innovation, CANARIE's DAIR program enables small and medium-sized enterprises (SMEs) to access and productively utilize powerful cloud computing resources to advance their ICT research and development efforts. DAIR provides an opportunity for entrepreneurs to accelerate time-to-market de-risks the innovation process for SMEs by reducing their need to invest in large in-house computing resources and facilitates on-going communications among DAIR cloud service members so that SMEs and entrepreneurs can freely exchange best practices and lessons learned with like-minded individuals. DAIR exposes users to the power of cloud technologies to transform traditional business models and provides these businesses with an opportunity to adopt these technologies as part of their long-term growth strategy.

Increased number of users of CANARIE's cloud services program

The cumulative count of users grew to 1,776 by the end of FY22, ahead of the target of 1,749 total users.

New features added to the DAIR cloud platform

CANARIE is in the process of updating the DAIR Cloud Broker tool, and on track to complete the migration of users by the end of Q1 FY23. Upgrades implemented in FY22 incorporated features such as Load Balancers and a Service Catalogue which provides a view of BoosterPacks in the catalogue and simplifies the deployment of sample applications.

Content released to educate SMEs on cloud independence and security in the cloud

CANARIE continues to work with the DAIR community on cloud independence and security in the cloud. In FY22, CANARIE delivered one community webinar, "Advanced Cloud Security", and more webinars are planned for FY23.

Monitor ongoing cloud usage patterns of SMEs as they develop and test cloud-based applications and services

The DAIR cloud broker tool allows CANARIE to monitor participant usage patterns and services in use by cloud provider on the DAIR cloud platform. This data is analyzed internally to support program planning and prioritization for future enhancements to the DAIR cloud platform.

"Beyond the cloud resources, we received great technical support from the DAIR team, the DAIR Slack Channel, DAIR's regular webinars, and archive of materials from earlier presentations. All of it was very handy."

Arun Munje, CEO. AIHEARU

Provide additional BoosterPack Tutorials, to reduce the time and cost for SMEs to develop new technology skills

A new BoosterPack, developed by Ottawa-based Senofi, to support SMEs building private blockchain networks on the open source Hyperledger Fabric framework, was launched in FY22.

Further advance the partnership between DAIR and CENG, making participant transitions between programs more apparent and seamless

CANARIE and CENG continue to work collaboratively on joint referral opportunities for the SME community through targeted communications of each program's benefits to current and potential participants, and it highlights the possible transition between the two organizations programs. In FY22, this included hosting two joint webinars.

Other Achievements – DAIR:

Rockport Collaboration

CANARIE, in collaboration with the Alliance, hosted a webinar with Rockport Networks, a Kanata-based company, for the Advanced Research Computing (ARC) community in Canada. Through this and subsequent engagements facilitated by CANARIE and the Alliance, Rockport has supplied ACENET, the supercomputing organization in Atlantic Canada, with switchless data centre networking solutions for their data centres for product validation, thereby allowing a Canadian company access to new markets.

Quantropi Collaboration

CANARIE, together with Cybera, the NREN Partner in Alberta, worked with the Canadian cybersecurity company Quantropi, to allow them to test their end-to-end quantum-secure data communication solution on the NREN infrastructure. This partnership with the NREN allowed a Canadian company to validate an innovation solution on a large production network before launching it commercially.

Centre of Excellence in Next Generation Networks (CENG):

Overview of CENG

CANARIE is a founding partner in the Centre of Excellence in Next Generation Networks (CENG) which was launched in 2015. CENG is a consortium of industry (including Juniper, Cisco, Nokia, EXFO, Bell, TELUS), academic, and research leaders who are pooling their expertise and equipment to lower the barrier to market entry for SMEs and researchers.

CENG will be able to leverage the CANARIE network to support advanced testing and demonstration of new ICT products and services

CANARIE continues to play a key role in CENG initiatives as CANARIE network resources are made available to support test-bed infrastructure for new product validation and testing.

2.4 Activities Supporting Equity, Diversity, and Inclusion

CANARIE is supportive of the diverse communities it serves, and as such, is committed to activities that advance Equity, Diversity, and Inclusion (EDI).

CANARIE continues to support the growth of a diverse workforce. All job postings commit to providing accommodations upon request by any candidate. CANARIE also strives for diversity in its Board composition supported by the CANARIE Board Diversity Policy. That policy states: “ensure the Board composition includes a diverse set of perspectives, which reflects our core stakeholders and the varied personal and demographic characteristics of Canadian society.”

Development of an Equity, Diversity, and Inclusion statement shared with other DRI providers; and Development of CANARIE’s EDI philosophy

In concert with the Alliance, CANARIE co-developed an EDI Commitment Statement, which will be published on both organizations’ websites.

Development of CANARIE’s equity, diversity, and inclusion action plan

Working with an external expert, CANARIE developed key EDI activities over a five-year horizon, and those which were set to take place in FY22 were adapted into the CANARIE FY22 EDI Action Plan. A similar action plan has been developed for FY23, and activities are being tracked against it.

Comprehensive training for CANARIE and the NREN GC

CANARIE staff received EDI training in February 2022, and CANARIE is currently scheduling similar training sessions for both the CANARIE Board of Directors and the NREN Governance Committee.

Compliance with the Board diversity policy

CANARIE continues to comply with its Board diversity policy, and recently updated its Board Competency Matrix to make EDI an explicitly tracked consideration. CANARIE has signed on to the *50-30 Challenge*, an initiative between the Government of Canada, business, and diversity organizations. The goal of the program is to challenge Canadian organizations to increase the representation and inclusion of diverse groups within their workplace.

Other Achievements – EDI

In line with CANARIE’s FY22 EDI Action Plan, CANARIE carried out several key activities during the year. These included:

- Updated CANARIE’s Program and Project Charters, to include explicit consideration of EDI at the launch of each new program or project;
- Launched a year long engagement with an Indigenous knowledge keeper and storyteller, in order to engage staff on truth and reconciliation;
- Undertook a primary review of HR policies to provide EDI updates to policies as needed; and
- Added “inclusion” as a corporate value.

3. Statement of Eligible Activities for 2022-23 and for the Foreseeable Future

In 2022-23, CANARIE will continue to align its activities towards the goal of strengthening Canada’s digital research infrastructure, with a focus on the three eligible activities, as laid out in the 2022-23 Business Plan.

3.1 Network Operations

3.1.1 CANARIE Network

Deployment of additional network capacity to support traffic growth

CANARIE will continue to improve the capacity, redundancy, and resiliency of the CANARIE network to meet the needs of Canada's research, education, and innovation communities.

Improved commercial cloud support

Late in FY22, CANARIE began a pilot project to experiment with a more advanced Cloud Connect Service (CCS) that is complementary to existing cloud connect capabilities. The goal of this project is to examine and evaluate technical and financial aspects of CCS deployment, gain operational experience in provisioning and delivering CCS, and collect throughput performance measurement data for further reference. NREN Partners will use findings as input for the discussion regarding the development of future NREN Cloud Connect Services. This project will continue through FY23.

Refresh of the largest segment of the Central fibre system

CANARIE has extended the central fibre agreement for another 10 years. This central fibre segment is an important corridor of the network, linking the western and eastern optical systems across the country, and the extension will secure the use of the fibre for the coming mandates.

CANARIE started planning the upgrade of the optical system for this corridor with an initial deployment scheduled in FY23, but with supply chain issues impacting the entire IT sector, the deployment could be delayed into FY24. The new platform will support network speeds beyond 400Gbps, equipping the optical infrastructure to support traffic growth of intensive global scientific research.

Commence work on the refresh of the Eastern fibre system

The Eastern fibre IRU agreement is coming to end in FY24/FY25, and the transition to a new fibre system will be a multi-year project starting from a procurement of long-haul fibre to completion of a new optical system deployment.

Deployment of additional network capacity to support Northern connectivity

CANARIE will improve the capacity, redundancy, and resiliency of the CANARIE network in Northern Canada, to meet the needs of Canada's research, education, and innovation communities in these regions.

Improvement of network security reporting, monitoring, and measurement system

CANARIE will continue to work with the NREN Partners on the NREN SIEM Deployment Project, to improve the security of both the CANARIE Network and the NREN as a whole, and to maintain a community of NREN security analysts across the country.

Improvement of the Global Research and Education Network (GREN) Map

CANARIE is collaborating with the international community in support of a full version 1 launch of the GREN Map in FY23.

Deployment of the Software Networking Applications

CANARIE will continue to explore opportunities and technologies to deploy Network Automation tools for streamlining the network operational processes and improving alert notifications.

Deployment of support tools accessible through the user portal

CANARIE continues to develop features for the network support portal and improve support for users.

Continue to support connections to government research facilities that meet the performance needs of the government science community

CANARIE continues working with Shared Services Canada to evaluate departmental needs in supporting the government science community.

3.1.2 Canadian Access Federation:

Increased adoption of CAF services

CANARIE will continue to promote the benefits of the Canadian Access Federation – both *eduroam* and Federated Identity Management – to the research and education community.

Increased number of eduroam logins per year, following the decline in March 2020 due to COVID-19

CANARIE expects to see continued growth in *eduroam* logins as more students, faculty, and staff are expected on campus following the COVID-19 pandemic.

Increased number of projects to upgrade the capacity/capability of the federation; and Increased number of interfaces, applications, and tools available to support CAF services

CANARIE will continue to investigate opportunities to extend the reach and expand the benefit of the CAF identity services, including with the private sector, and to integrate CAF services with the broader cybersecurity portfolio offered by CANARIE.

3.1.3 Cybersecurity Initiatives Program:

DNS Firewall, Intrusion Detection System, and Threat Feed initiatives deployed for all interested eligible organizations

CANARIE will continue to work with our NREN partners to encourage adoption of all initiatives.

Implement Cybersecurity Benchmarking and National Cybersecurity Assessment initiatives deployed at eligible organizations and results collection in progress

CANARIE will continue to work with our NREN partners to deploy new initiatives and to encourage their ongoing adoption.

Define the next set of Cybersecurity initiatives

CANARIE will work with the Cybersecurity Advisory Committee and its standing committees to define future initiatives, guided by the data collected from the CUCCIO Cybersecurity Benchmarking and National Cybersecurity Assessment initiatives.

3.1.4 NREN Program:

Execution underway for projects defined in the NREN FY23 Operational Plan; and Execution underway for all approved projects in NREN Call 2 for increased reliability, capacity, and resiliency of networks operated by NREN Partners

Execution will either continue or commence on all approved projects.

Increase NREN security through continuation of the NREN SIEM project and continued development of the federated NREN Cybersecurity Analyst team

Agreements are executed, or in process, to extend the Analyst team for FY23.

Development and launch of projects to enhance security

CANARIE is working with the NREN GC to prioritize and action cybersecurity initiatives to enhance security for the NREN, and for their member institutions. This is an ongoing focus for the NREN GC and its Committees and Working Groups in FY23.

Continued progress towards the technical implementation of the Nunavut NREN Partner

Work will continue, through the relationship established with Nunavut Arctic College, to develop a framework that will support the realization of an NREN connection in Nunavut.

Organization of an NREN Assembly event to foster engagement between NREN Partners

The NREN Assembly is now an annual event bringing together staff from various departments across the NREN, to foster engagement and understanding of our shared goals. The Assembly is planned as an in-person event to take place in October 2022 in Toronto.

3.2 Technology Innovation

3.2.1 Research Software Program:

Transition to the second maintenance portions of projects funded under platform Call 3

All projects will transition to their second maintenance phase during FY23. Additionally, all Local Research Software Support Call 1 teams will transition to their final year of funding during FY23.

Continued evolution of a research software community in Canada

CANARIE will continue to support the research software community in Canada in partnership with the Alliance, including hosting the 2022 Canadian Research Software Conference.

3.2.2 Research Data Management:

Technical and financial audits of Call 2 funded projects completed as required

CANARIE will carry out all necessary audits of by the end of FY23.

3.2.3 Innovation Fund:

Execution underway on the first identified project(s)

Work will begin to execute upon selected project(s) in line with the CANARIE approvals process.

3.3 Private Sector Innovation:

3.3.1 DAIR Program:

Increase usage of DAIR

CANARIE will continue to accept applicants and to promote the DAIR program, and the benefits of cloud computing, to Canadian SMEs.

New features added to the DAIR cloud platform

CANARIE will leverage Canadian public cloud to speed up SMEs' access to new cloud services based on availability, demand, and the ability to monitor and control spending within an allocated budget.

Content released to educate SMEs on cloud independence and security in the cloud

CANARIE will develop tutorials - published in the form of website documents, blog posts, or short videos intended - to increase participant knowledge in the areas of cloud independence, cloud development, and cloud security best practices.

Monitor ongoing cloud usage patterns of SMEs as they develop and test cloud-based applications and services

CANARIE will monitor and evaluate cloud usage patterns to inform stakeholders and provide valuable input for future strategic investments and direction in the DAIR program.

Provide additional BoosterPack Tutorials, to reduce the time and cost for SMEs to develop new technology skills

CANARIE expects to release 4 new BoosterPacks during FY23.

Further advance the partnership between DAIR and CENG, making participant transitions between programs more apparent and seamless

CANARIE will continue to work with CENG and other stakeholders to develop an integrated ecosystem of support for SMEs.

3.3.2 Centre of Excellence in Next Generation Networks (CENG):

CENG will be able to leverage the CANARIE network to support advanced testing and demonstration of new ICT products and services

There continues to be a robust pipeline of new projects at CENG that will likely leverage the CANARIE network. CANARIE continues to work with partners at CENG to evolve the infrastructure to develop an enhanced level of capability.

CANARIE also continues to participate in discussions with public and private sector stakeholders wishing to gain CANARIE's support for new network test-bed initiatives. This interest indicates the critical role of advanced networking in supporting a range of strategic technology research and development projects.

CANARIE will continue to work with its stakeholder partners and the Government of Canada to ensure that its powerful network infrastructure is leveraged to support Canadian competitiveness in advanced technologies.

3.4 Activities Supporting Equity, Diversity, and Inclusion:

In 2022-23 CANARIE will continue to implement activities that support EDI. CANARIE plans to continue working with the Alliance, and our expected outcomes for 2022-23 include:

- Development of CANARIE's Commitment to Reconciliation (based on Call to Action #92)
- Update of policies which incorporate EDI considerations
- Execution of CANARIE's equity, diversity, and inclusion FY23 Action Plan
- Development of the FY24 Action Plan
- Development of training catalogue for CANARIE and the NREN GC
- Continued compliance with the Board diversity policy, and commitment to the 50-30 Challenge
- Established diversity targets for all committees and working groups to the extent possible
- Development of plans/programs for serving Indigenous higher-ed communities

Over the next year, CANARIE will ensure that all activities that have been implemented to achieve these eligible activities will be successfully completed, in line with the terms and conditions of CANARIE's Contribution Agreement.

4. List of Eligible Projects and Funding Provided to Each

4.1 National Research and Education Network Program (NREN)

The NREN program continues to support the advancement of Canada's National Research and Education Network. The program's key objective is to strengthen the impact of Canada's co-delivery model and enable aligned strategic evolution of the NREN based on national priorities. Program objectives are achieved through a variety of initiatives:

- Competitive funding enables provincial/territorial network partners to upgrade network infrastructure and extend provincial network connections;
- Directed funding ensures that the National Research and Education Network evolves in a consistent, coherent and strategic manner;
- Interconnection and Co-delivery funding ensures that provincial and territorial partners support co-delivery of the NREN and comply with the requirements of CANARIE's Interconnection Agreement; and
- Operating and Strengthening the NREN promotes the impact of Canada's co-delivery model.

Table 4.1 details the NREN partners that utilized Competitive NREN funds.

Table 4.1 NREN Program – Competitive Funding Calls (\$ 000s)

NREN Partner	Funding			
	2020-21	2021-22	Commitments	Total
ORION	-	1,363	1,194	2,557

RISQ	-	-	813	813
BCNET	96	-	400	496
Cybera	17	128	258	403
SRNET	-	-	184	184
ECN-NB	-	-	130	130
MRnet	-	-	119	119
ACORN-NS	-	-	103	103
ECN-PEI	-	-	31	31
Total	113	1,491	3,232	4,836

In 2021-2022, the NREN Program extended the funding of the Cybersecurity Analyst at each of the NREN Partners. Table 4.1a details the utilization of the funds during the year.

Table 4.1a NREN Program – Directed Funding (\$ 000s)

NREN Partner	2021-22
BCNET	83
ORION	82
Yukon University	78
SRNET	66
ACORN-NS	60
ECN-NB	51
Cybera	48
ACORN-NL	21
RISQ	11
MRnet	9
Total	509

In 2021-22, \$.245M was paid to the NREN Partners for Interconnection and Co-delivery.

In 2021-22, \$0.042M was utilized to support Nunavut Arctic College and development of their R&E network.

4.2 Cybersecurity Initiatives Program (CIP)

The CIP provides investments in initiatives that will strengthen cybersecurity efforts of the research and education sector with advanced technologies, improved processes, and broadened expertise. These initiatives are delivered to eligible organizations through the provincial and territorial partners in Canada's NREN.

The Intrusion Detection System (IDS) initiative was launched in 2020-21. Table 4.2 details the utilization of the funds for participating institutions and 3 IDS platform projects under that initiative.

Table 4.2 Intrusion Detection System (\$ 000s)

Platform Projects	Funding			
	2020-21	2021-22	Commitments	Total
Institutional Participation	129	192	273	594
Platform Projects				

Concordia University	28	99	33	160
University of Waterloo	50	75	-	125
McMaster University	50	27	-	77
Total	257	393	306	956

The Threat Feed initiative was launched in 2021-22. Table 4.2a details the utilization of the funds.

Table 4.2a Threat Feed and National Security Analyst (\$ 000s)

Initiative	Funding			
	2020-21	2021-22	Commitments	Total
University of Toronto				
Threat Feed	498	863	439	1,800
National Security Analyst	-	157	-	157
Total	498	1,020	439	1,957

In 2021-22

1. \$.823M was utilized to secure CIRA DNS Firewall services for eligible organizations.
2. \$.358M was utilized to support the Cybersecurity Benchmarking initiative.
3. \$.250M was utilized to support the National Cybersecurity Assessment.
4. \$.528M was paid to the NREN Partners for community collaboration support.

4.3 Research Software Program

The Research Software Program leverages the services developed under previous mandates to drive collaborative development of reusable software services and adaptation of existing research platforms for use across multiple research domains.

The Research Software Program launched its first funding call of the current mandate in 2020-21. Table 4.3 details the projects that were approved for funding under that call, and the utilization of the funds.

Table 4.3 Research Software Program – Call 3 (\$ 000s)

Lead Contractor	Funding			
	2020-21	2021-22	Commitments	Total
University of Victoria	77	123	100	300
Ontario Institute for Cancer Research	100	99	100	299
London Health Sciences Centre Research Inc.	97	80	119	296
University of Toronto	64	131	99	294
McGill University	88	90	113	291
École de Technologie Supérieure	41	109	100	250
Université du Sherbrooke	50	100	100	250
Queen's University	51	99	100	249
University of Waterloo	44	106	100	249
University of Waterloo	50	99	100	249

Simon Fraser University	29	119	100	248
Bird Studies Canada	50	97	100	247
McGill University	41	74	114	229
Concordia University	25	49	115	189
Total	807	1,375	1,460	3,642

The Research Software Program launched the first local research software support call of the current mandate in 2020-21. Table 4.3a details the projects that were approved for funding under that call, and the utilization of the funds.

Table 4.3a Research Software Program – Local Research Software Support - Call 1 (\$ 000s)

Lead Contractor	Funding			
	2020-21	2021-22	Commitments	Total
University of Sherbrooke	71	214	315	600
Simon Fraser University	90	307	203	600
University of Laval	73	240	287	600
University of Calgary	58	218	324	600
Sunnybrook Research Institute	126	190	283	599
University of Ottawa	34	305	260	599
Total	452	1,474	1,672	3,598

4.4 Research Data Management

The Research Data Management Program continues to support and enable national initiatives that advance the appropriate management of research data across Canadian sectors, fueling new discoveries and business opportunities.

The Research Data Management Program launched its first funding call of the current mandate in 2020-21. Table 4.4 details the projects that were approved for funding under that call, and the utilization of the funds.

Table 4.4 Research Data Management – Call 2 (\$ 000s)

Lead Contractor	Funding			
	2020-21	2021-22	Commitments	Total
The Hospital for Sick Children	326	335	-	661
Indoc Research	248	251	-	499
Simon Fraser University	223	257	-	480
Total	797	843	-	1,640

4.5 Digital Accelerator for Innovation and Research (DAIR) Program

DAIR is an integrated virtual environment that leverages the CANARIE network to enable SMEs to develop and test new ICT and other digital technologies.

DAIR committed funding to partners to manage the DAIR resources and ensure their availability and maintenance for the duration of the mandate. Table 4.5 details the utilization of the funds in the year.

Table 4.5 Digital Accelerator for Innovation and Research (DAIR) Program (\$ 000s)

Lead Contractor	Funding			
	2020-21	2021-22	Commitments	Total
Cybera	151	258	336	745
Total	151	258	336	745

In 2021-22, \$.091M was paid to support the BoosterPack Tutorials and \$.539M paid to support the cloud platform.

5. Summary of Spending on Eligible Expenditures

Total Eligible Expenditures in 2021-22 were \$29,582M. Table 5.0 details the expenditures.

Table 5.0 Eligible Expenditures (\$ 000s)

Expenditures	Audited Financial Statements	Commitments 2015-20	Accounting Adjustments *	Total Eligible Expenditure 2021-22
PROGRAM				
Network Operations				
Network Infrastructure & Services	11,292	(9)	(604)	10,679
Network Security	682	-	(105)	577
Joint Security Project (CIP)	4,458	42	131	4,631
NREN	2,967	(10)	(78)	2,879
Technology Innovation				
Research Software	3,113	(9)	(12)	3,092
Research Data Management	876	53	32	961
Research Data Canada	75	-	-	75
Private Sector Innovation	1,772	-	(4)	1,768
Total Program	25,235	67	(640)	24,662
Operating Expenses	4,994	-	(74)	4,920
Total	30,229	67	(714)	29,582

*Accounting adjustments include timing differences for assets purchases and related amortization.

6. Statement of Total Funding Received

In 2021-22, CANARIE received \$29.368M in total funding to support Eligible Activities. Table 6.0 details the funding sources.

Table 6.0 Total Funding Received (\$ 000s)

Funding Received	2021-22
ISED Funding	28,700
User Fees	605
Interest Income	63
Total	29,368

Table 6.0a details the 2021-22 Cost Recovery from CANARIE programs in the current mandate.

Table 6.0a Total Cost Recovery (\$ 000s)

Cost Recovery	2021-22
Matching Funds	
NREN	993
DAIR	25
Total Matching Funds	1,018
In-Kind Contributions	
Research Software	771
Research Data Management	183
Total In-Kind Contributions	954
Total	1,972

7. Criteria Applied to Select Eligible Projects

Project proposals are reviewed relative to the mandatory criteria and the scoring criteria for each program. These criteria are approved by the CANARIE Board of Directors. Evaluation of proposals relative to these criteria constitute the basis for the decision whether a project receives CANARIE funding. Projects that fail to meet the mandatory criteria or fail to meet evaluative criteria to an acceptable degree, are not funded.

8. Statement of Compensation

Directors on CANARIE's Board, including officer positions such as Chair, Vice-Chair and Secretary/Treasurer, receive no compensation beyond reimbursement for any reasonable out-of-pocket expenses incurred while performing their duties or attending CANARIE meetings.

The President and CEO of the organization has a compensation package that is benchmarked regularly against external comparatives by an external consultant and overseen by the HR (Executive) Committee of the Board. All other staff positions at CANARIE are classified according to a structured system that assigns a salary range to each position. The system and staff salaries are regularly benchmarked against comparative organizations by an external consultant.

For the fiscal year ending March 31, 2022, salary ranges for all officers and employees of CANARIE whose total compensation remuneration paid exceeded \$100,000 (including any fee, allowance or other benefit) are presented below.

Officers

President and CEO

\$337,500 - \$468,700

Chief Financial Officer

Chief Technology Officer

Vice President, Business Development

Vice President, External Relations
Vice President, Legal and Corporate Governance
\$189,100 - \$297,000

Employees

Chief Engineer
Director, Cybersecurity
Senior Director, Applications
Senior Director, Business Development
Senior Director, Programs
\$153,000 - \$243,800

Director, Communications
Director, Finance
Director, IT
Director, Program Operations
Director, Strategic Policy and Analysis
Senior Network Engineer
\$113,700 - \$186,500

DevOps Specialist
Finance Manager
Financial Systems Manager
Manager, Analytics
Manager, Human Resources
Manager, Marketing Communications
Manager, Network
Manager, Program Accounting
Manager, Program Marketing and Adoption
Manager, Software Development
Network Engineer
Program Manager, NREN
Project Manager
Senior Cybersecurity Analyst
Senior Program Operation Coordinator
Software Developer
Solution Architect
Technology Architect, Canadian Access Federation
\$100,000 - \$154,000

Cybersecurity Analyst
Network Engineer
Senior IT Specialist
Software Developer
Support Specialist, Cloud

Test Engineer
\$100,000 - \$121,500

9. Statement of CANARIE's Investment Policies, Standards, and Procedures

CANARIE's investment strategy is specifically tailored to the duration and quality constraints in terms of investment options imposed by the Statement of Investment Policy and the Contribution Agreement with Innovation, Science and Economic Development Canada. These constraints, while deemed appropriate and necessary to meet the overall objectives of CANARIE, preclude a more active approach to investment management.

Rather than active investment management, the strategy adopted by CANARIE is "buy and hold", based on the following framework:

- Investment maturities will, wherever possible, match the forecasted cash requirements of CANARIE.
- The quantitative limits on investment holdings provide ample structural liquidity to meet the needs of CANARIE. It is appropriate, therefore, to hold less liquid types of approved investments. Value added will be achieved by moving out the "liquidity curve" when possible.
- At all times, CANARIE will hold investments deemed eligible under the Statement of Investment Policy.

Within this context, CANARIE's official Statement of Investment Policy is adopted by the Board of Directors and reviewed and approved in the year by the Audit & Investment Committee of the Board. It was last reviewed and approved in October 2021. There were no changes to the Policy, standards, or procedures during the year.

10. Summary of the Results of Audits and Evaluations Carried Out During the Year

Financial Audit: CANARIE annually provides for a Financial Audit undertaken by independent auditors who are approved each year by CANARIE's membership and overseen by the Audit and Investment Committee of the Board. The results of this Audit are provided to the Minister as part of each year's Annual Report to the Minister. The Financial Audit for the 2021-22 Fiscal Year was completed in June 2022 by BDO Canada LLP, Chartered Professional Accountants.

Recipient Audits: In agreements with Eligible Ultimate Recipients for Eligible Projects, CANARIE is required to provide for the conduct of an audit of:

- (i) any Eligible Project where CANARIE's contribution exceeds \$1M,
- (ii) any Eligible Project where CANARIE deems that an audit is appropriate, and
- (iii) a representative sample of projects to which CANARIE has contributed less than \$1M,

according to the terms and procedures set out in the Performance and Risk Framework and the Contribution Agreement.

CANARIE includes in its contracts with Eligible Ultimate Recipients a requirement for the conduct of an audit by an auditor selected by CANARIE for all funded projects, regardless of the amount of CANARIE

funding received. This provides CANARIE with the ability to audit projects, where warranted or deemed appropriate, and to perform representative sample audits.

Through a competitive procurement process CANARIE selected two audit firms to manage the recipient audits. The firms audited the projects where funding was provided during the current mandate, according to an audit plan that was developed to meet the requirements of the Contribution Agreement, and the Performance and Risk Framework developed for the current mandate.

The following tables reflect the audits performed in fiscal 2021-22 by program.

Table 10.0 Recipient Audits – Cybersecurity Initiatives Program

Lead Contractor	Project
Concordia University	CANARIE Joint Security Information Exchange

Table 10.0a Recipient Audits – Research Software

Lead Contractor	Project
Carleton University	Local Software Support Pilot
Ocean Networks Canada	Research Platform for User-Defined Oceanographic Data Products
University of Guelph	Canadian Writing Research Collaboratory (CWRC)

Table 10.0b Recipient Audits – NREN

Lead Contractor	Project
ACORN-NL	SIEM Deployment Project – SIEM Staffing
ACORN-NS	SIEM Deployment Project – SIEM Staffing
BCNET	SIEM Deployment Project – SIEM Staffing
Cybera	SIEM Deployment Project – SIEM Staffing
ECN-NB	SIEM Deployment Project – SIEM Staffing
MRnet	SIEM Deployment Project – SIEM Staffing
ORION	SIEM Deployment Project – SIEM Staffing
RISQ	SIEM Deployment Project – SIEM Staffing
SRNET	SIEM Deployment Project – SIEM Staffing
Yukon University	SIEM Deployment Project – SIEM Staffing

Table 10.0c Recipient Audits – DAIR Project

Lead Contractor	Project
Cybera	DAIR Infrastructure Project 2.0

Appendix 1: CANARIE Inc. Financial Statements – March 31, 2022

~ attached ~

CANARIE Inc.
Financial Statements
For the year ended March 31, 2022

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Independent Auditor's Report

To the members of CANARIE Inc.

Opinion

We have audited the financial statements of CANARIE Inc., which comprise the statements of financial position at March 31, 2022 and the statements of operations, changes in net assets and cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of CANARIE Inc. as at March 31, 2022 and its financial performance and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

Basis for Opinion

We conducted our audit in accordance with Canadian generally accepted auditing standards. Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Statements* section of our report. We are independent of CANARIE Inc. in accordance with the ethical requirements that are relevant to our audit of the financial statements in Canada, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Other Information

Management is responsible for the other information. The other information comprises the information included in the annual report.

Our opinion on the financial statements does not cover the other information and we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information identified above and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated.

We obtained the annual report prior to the date of this auditor's report. If, based on the work we have performed on this other information, we conclude that there is a material misstatement of this other information, we are required to report that fact in this auditor's report. We have nothing to report in this regard.

Responsibilities of Management and Those Charged with Governance for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing CANARIE Inc.'s ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate CANARIE Inc. or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing CANARIE Inc.'s financial reporting process.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Canadian generally accepted auditing standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with Canadian generally accepted auditing standards, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of CANARIE Inc.'s internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on CANARIE Inc.'s ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause CANARIE Inc. to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.



We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

BDO Canada LLP

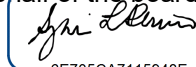
Chartered Professional Accountants, Licensed Public Accountants

Ottawa, Ontario
June 27, 2022

CANARIE Inc. Statement of Financial Position

March 31	2022	2021
Assets		
Current		
Cash	\$ 2,708,935	\$ 1,245,611
Investments (Note 2)	14,459,635	17,256,821
Accounts and other receivable	710,008	975,942
Prepaid expenses and deposits (Note 3)	5,194,036	5,121,259
	<u>23,072,614</u>	<u>24,599,633</u>
Investments (Note 2)	362,674	-
Prepaid expenses and deposits (Note 3)	5,676,637	6,157,176
Tangible capital assets, assets under capital lease and intangible asset (Note 4)	15,399,150	11,975,682
	<u>\$ 44,511,075</u>	<u>\$ 42,732,491</u>
Liabilities and Net Assets		
Current		
Accounts payable and accrued liabilities (Note 5)	\$ 4,126,308	\$ 5,547,938
Deferred revenue	2,874	40,000
Deferred funding (Note 6)	5,959,132	10,310,545
Current portion of obligations under capital leases (Note 8)	222,114	244,082
	<u>10,310,428</u>	<u>16,142,565</u>
Deferred funding (Note 6)	10,946,287	7,141,722
Deferred capital funding (Note 7)	10,923,838	11,278,630
Obligations under capital leases (Note 8)	4,253,198	452,970
	<u>36,433,751</u>	<u>35,015,887</u>
Commitments (Note 9)		
Net Assets		
Unrestricted	103,580	57,792
Internally restricted royalty fund	2,467,621	2,462,819
Internally restricted for windup of operations	5,506,123	5,195,993
	<u>8,077,324</u>	<u>7,716,604</u>
	<u>\$ 44,511,075</u>	<u>\$ 42,732,491</u>

On behalf of the board:



Director

DocuSigned by:



Director

CANARIE Inc.
Statement of Changes in Net Assets

For the year ended March 31	Unrestricted	Internally Restricted Royalty Fund (Note 10)	Internally Restricted for Windup of Operations (Note 10)	2022	2021
Balance, beginning of the year	\$ 57,792	\$2,462,819	\$ 5,195,993	\$ 7,716,604	\$ 7,425,199
Membership	338,958	-	-	338,958	326,875
Investment					
income	113	4,802	10,130	15,045	89,060
Recovery					
(expenses)	6,717	-	-	6,717	(124,530)
Excess of revenues over expenses	345,788	4,802	10,130	360,720	291,405
	403,580	2,467,621	5,206,123	8,077,324	7,716,604
Interfund transfers (Note 10)	(300,000)	-	300,000	-	-
Balance, end of the year	\$ 103,580	\$2,467,621	\$ 5,506,123	\$ 8,077,324	\$ 7,716,604

CANARIE Inc.
Statement of Operations

For the year ended March 31	2022	2021
Revenues		
Industry Canada / ISED funding	\$ 30,229,275	\$ 29,484,244
Membership	338,958	326,875
Investment income	15,045	89,060
	<hr/>	<hr/>
	30,583,278	29,900,179
Expenses (Schedule)		
Program	25,235,200	25,496,800
Operating	4,994,075	3,987,444
Corporate (recovery)	(6,717)	124,530
	<hr/>	<hr/>
	30,222,558	29,608,774
Excess of revenues over expenses	<hr/>	<hr/>
	\$ 360,720	\$ 291,405

CANARIE Inc.
Schedule of Expenses

For the year ended March 31	Program	Operating	Corporate	2022 Total
Direct program	\$ 16,240,330	\$ -	\$ -	\$ 16,240,330
Employee and consultants (recovery)	6,158,446	3,389,483	(8,860)	9,539,069
Marketing and promotion	117,978	86,768	-	204,746
Travel	16,426	10,694	-	27,120
Rent	-	565,119	-	565,119
General office and supplies	12,757	257,546	2,143	272,446
Meetings and conferences	7,145	14,515	-	21,660
Equipment, software and maintenance	97,138	223,212	-	320,350
Professional fees	73,382	32,844	-	106,226
Interest on obligations under capital leases	35,173	-	-	35,173
	22,758,775	4,580,181	(6,717)	27,332,239
Plus: amortization	2,476,425	413,894	-	2,890,319
	\$ 25,235,200	\$ 4,994,075	\$ (6,717)	\$ 30,222,558

CANARIE Inc.
Schedule of Expenses

For the year ended March 31	Program	Operating	Corporate	2021 Total
Direct program	\$ 16,735,595	\$ -	\$ -	\$ 16,735,595
Employee and consultants	5,594,988	2,908,629	123,595	8,627,212
Marketing and promotion	85,376	100,736	-	186,112
Travel	3,043	2,756	-	5,799
Rent	-	480,326	-	480,326
General office and supplies	55,454	199,695	823	255,972
Meetings and conferences	8,711	1,925	-	10,636
Equipment, software and maintenance	99,610	162,868	-	262,478
Professional fees	218,897	28,885	-	247,782
Interest on obligations under capital leases	44,924	-	-	44,924
	22,846,598	3,885,820	124,418	26,856,836
Plus: amortization	2,650,202	101,624	112	2,751,938
	\$ 25,496,800	\$ 3,987,444	\$ 124,530	\$ 29,608,774

CANARIE Inc.
Statement of Cash Flows

For the year ended March 31	2022	2021
Cash flows from operating activities		
Industry Canada / ISED funding	\$ 28,700,000	\$ 30,200,000
Membership	301,834	366,875
Program - interest	63,149	64,605
Program - user fees	458,917	669,009
Investment income - Corporate	113	657
Investment income - Royalty Fund	4,802	29,190
Investment income - Windup of Operations	10,130	59,213
Program expenses	(23,105,250)	(25,036,698)
Operating expenses	(4,718,083)	(3,863,745)
Corporate expenses	66	(823)
	<u>1,715,678</u>	<u>2,488,283</u>
Cash flows from investing activities		
Acquisition of tangible capital assets and intangible asset	(2,005,040)	(2,332,075)
Proceeds on disposal of tangible capital assets	150	640
Purchase of investments	(26,565,488)	(30,132,864)
Proceeds from disposal of investments	29,000,000	20,500,000
	<u>429,622</u>	<u>(11,964,299)</u>
Cash flows from financing activities		
Repayment of obligations and interest under capital leases	(681,976)	(2,130,617)
	<u>1,463,324</u>	<u>(11,606,633)</u>
Net increase (decrease) in cash	1,463,324	(11,606,633)
Cash, beginning of the year	<u>1,245,611</u>	<u>12,852,244</u>
Cash, end of the year	<u>\$ 2,708,935</u>	<u>\$ 1,245,611</u>

CANARIE Inc.
Notes to Financial Statements

March 31, 2022

1. Significant Accounting Policies

**Purpose of
Organization**

CANARIE Inc. was incorporated on March 5, 1993 as a non-profit organization without share capital under Part II of the Canadian Corporations Act. CANARIE Inc. was continued under section 211 of the Canada Not-for-profit Corporations Act on November 19, 2013. The objective of CANARIE Inc. is to support the development of the communications infrastructure for a knowledge-based Canada.

As a corporation constituted exclusively for the purpose of carrying on or promoting scientific research and experimental development, CANARIE Inc. is exempt from the payment of income taxes under Section 149(1)(J) of the Income Tax Act (Canada).

Basis of Accounting

The financial statements have been prepared in accordance with Canadian accounting standards for not-for-profit organizations.

Use of Estimates

The preparation of financial statements in accordance with Canadian accounting standards for not-for-profit organizations requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from management's best estimates as additional information becomes available in the future. Areas of significant estimates include useful lives of tangible capital assets, assets under capital lease and intangible asset.

Deferred Funding

Deferred funding relates to (1) funding received, including interest earned on funding, user fees collected and other recovered eligible costs, in advance of the funding period; (2) funding received for future service; and (3) funding received with respect to the purchase of tangible capital assets, assets under capital lease and intangible asset.

When tangible capital assets, assets under capital lease and intangible asset are disposed, the proceeds increase the deferred funding balance and the net book value decreases the deferred funding balance related to tangible capital assets, assets under capital lease and intangible asset.

CANARIE Inc.
Notes to Financial Statements

March 31, 2022

1. Significant Accounting Policies (continued)

Revenue Recognition CANARIE Inc. (the organization) follows the deferral method of accounting for contributions. Restricted contributions are recognized as revenue in the year in which the related expenses are incurred. Unrestricted contributions are recognized as revenue when received or receivable if the amount to be received can be reasonably estimated and collection is reasonably assured.

Funding related to tangible capital assets, assets under capital lease and intangible asset is deferred and recognized as revenue in the same year as the amortization expense of the related tangible capital assets, assets under capital lease and intangible asset.

Service contracts are recognized over the period of the services provided.

Membership fees are recognized over the period of membership.

Financial Instruments Measurement

The organization initially measures its financial assets and liabilities at fair value. The organization subsequently measures all its financial assets and liabilities at amortized cost, except for investments which it chose to measure at fair value. Changes in fair value are recognized in the statement of operations.

Impairment

Financial assets measured at amortized cost are tested for impairment when there are indicators of impairment.

Transaction costs

The organization recognizes its transaction costs in the statement of operations in the year incurred for financial instruments measured at fair value. Financial instruments that are subsequently measured at amortized cost are adjusted by the transaction costs in the initial measurement of the asset or liability.

CANARIE Inc.
Notes to Financial Statements

March 31, 2022

1. Significant Accounting Policies (continued)

Tangible Capital Assets and Intangible Asset	<p>Tangible capital assets and intangible asset are stated at cost less accumulated amortization. Amortization is provided on the basis of their useful lives using the following methods and annual rates:</p> <table><tr><td>Computer equipment</td><td>3 years straight-line basis</td></tr><tr><td>Equipment</td><td>3 years straight-line basis</td></tr><tr><td>Leasehold improvements</td><td>over the term of the lease</td></tr><tr><td>Furniture</td><td>5 years straight-line basis</td></tr><tr><td>Network equipment</td><td>5 years straight-line basis</td></tr><tr><td>Computer software</td><td>2 years straight-line basis</td></tr></table>	Computer equipment	3 years straight-line basis	Equipment	3 years straight-line basis	Leasehold improvements	over the term of the lease	Furniture	5 years straight-line basis	Network equipment	5 years straight-line basis	Computer software	2 years straight-line basis
Computer equipment	3 years straight-line basis												
Equipment	3 years straight-line basis												
Leasehold improvements	over the term of the lease												
Furniture	5 years straight-line basis												
Network equipment	5 years straight-line basis												
Computer software	2 years straight-line basis												
Impairment of Tangible Capital Assets and Intangible Asset	<p>When a tangible capital asset or intangible asset no longer has any long-term service potential to the organization, the excess of its net carrying amount over any residual value is recognized as an expense in the statement of operations.</p>												
Leases	<p>Leases are classified as capital or operating leases. A lease that transfers substantially all of the benefits and risks incidental to the ownership of property is classified as a capital lease. All other leases are accounted for as operating leases wherein rental payments are expensed as incurred.</p> <p>Assets under capital lease are stated at cost less accumulated amortization. They are amortized on a straight-line basis over the expected useful life of the asset to the organization, not to exceed twenty years, which currently corresponds to the term of the lease.</p>												
Contributed Services	<p>During the year, voluntary services (including donated time and travel of board and committee members) were provided. Because of the difficulty of determining their fair value, contributed services are not recognized in the financial statements.</p>												
Presentation of Expenses	<p>Program development, design and implementation activities are classified as program expenses. Activities which are not directly in support of Programs are classified as operating expenses. Activities not eligible for funding under a contribution agreement are classified as corporate expenses.</p>												

CANARIE Inc.
Notes to Financial Statements

March 31, 2022

2. Investments

Investments consist of Canadian government treasury bills with annual yields of 0.53% to 0.78% and maturities ranging from August 2022 to November 2022, short-term provincial government coupon bonds with annual yields ranging from 0.40% to 1.09% and maturities ranging from July 2022 to March 2023, short-term guaranteed investment certificates with annual yields ranging from 0.45% to 1.27% and maturities ranging from April 2022 to March 2023 and cash held in investment savings accounts with an annual yield of 0.45%.

Investments include a long-term provincial government coupon bond with an annual yield of 1.49% maturing in September 2023.

3. Prepaid Expenses and Deposits

	<u>2022</u>	<u>2021</u>
Program prepayments and deposits	\$10,570,721	\$11,024,751
Operating prepayments	263,452	217,184
Rental deposit	<u>36,500</u>	<u>36,500</u>
Balance, end of the year	10,870,673	11,278,435
Current portion	<u>5,194,036</u>	<u>5,121,259</u>
Long-term portion	<u>\$ 5,676,637</u>	<u>\$ 6,157,176</u>

CANARIE Inc.
Notes to Financial Statements

March 31, 2022

4. Tangible Capital Assets, Assets under Capital Lease and Intangible Asset

	2022		2021	
	Cost	Accumulated Amortization	Cost	Accumulated Amortization
Computer equipment	\$ 874,043	\$ 639,970	\$ 752,447	\$ 525,746
Equipment	337,151	210,253	327,430	139,232
Leasehold improvements	862,920	210,931	838,680	-
Furniture	247,365	73,864	232,090	26,576
Art	2,139	-	2,139	-
Network equipment	18,126,488	14,285,840	16,488,772	12,708,194
Fibre under capital lease	15,505,114	5,217,637	12,712,911	6,060,979
Computer software	349,790	267,365	275,019	193,079
	\$36,305,010	\$ 20,905,860	\$31,629,488	\$ 19,653,806
Net book value		\$ 15,399,150		\$ 11,975,682

During the year, computer equipment with a cost of \$15,727 (2021 - \$46,537) and accumulated amortization of \$15,727 (2021 - \$46,537) was disposed and removed from the total cost and total accumulated amortization.

During the year, equipment with a cost of \$Nil (2021 - \$17,195) and accumulated amortization of \$Nil (2021 - \$17,195) was disposed and removed from the total cost and total accumulated amortization.

During the year, furniture with a cost of \$Nil (2021 - \$234,672) and accumulated amortization of \$Nil (2021 - \$234,672) was disposed and removed from the total cost and total accumulated amortization.

During the year, leasehold improvements with a cost of \$Nil (2021 - \$464,519) and accumulated amortization of \$Nil (2021 - \$464,519) were disposed and removed from the total cost and total accumulated amortization.

During the year, the organization acquired fibre under capital leases with a cost of \$2,792,203 (2021 - \$Nil).

Accounts payable and accrued liabilities include purchased tangible capital assets with a cost of \$2,675 (2021 - \$137,073).

CANARIE Inc.
Notes to Financial Statements

March 31, 2022

5. Accounts Payable and Accrued Liabilities

	2022	2021
Accounts payable and accrued liabilities	\$ 4,126,308	\$ 5,515,649
Government remittances payable	-	32,289
	<u>\$ 4,126,308</u>	<u>\$ 5,547,938</u>

6. Deferred Funding

Pursuant to Funding Agreements signed on July 6, 2019, October 9, 2015, September 4, 2012, and March 28, 2007, the organization received funding of \$58,900,000, \$113,658,824, \$62,000,000 and \$120,000,000 respectively from Innovation, Science and Economic Development Canada (ISED) (formerly known as Industry Canada) for the design, development, deployment, improvement and operations of the CANARIE network and programs.

The balance of the funds has been reflected as follows:

	2022	2021
Balance, beginning of year	\$17,452,267	\$15,139,763
Industry Canada / ISED funding received	28,700,000	30,200,000
Program - user fees	556,966	671,955
Program - interest	63,149	64,605
Program - service contracts	7,519	7,520
Direct program and operating expenses	(27,338,956)	(26,481,003)
Transfer to operating for the acquisition of tangible capital assets, assets under capital lease and intangible asset	<u>(2,535,526)</u>	<u>(2,150,573)</u>
Balance, end of year	16,905,419	17,452,267
Current portion	<u>5,959,132</u>	<u>10,310,545</u>
Long-term portion	<u>\$10,946,287</u>	<u>\$ 7,141,722</u>

CANARIE Inc.
Notes to Financial Statements

March 31, 2022

7. Deferred Capital Funding

Deferred capital contributions represent amounts funded by Industry Canada / ISED for the purchase of tangible capital assets, assets under capital lease and intangible asset. Deferred funding related to tangible capital assets, assets under capital lease and intangible asset is summarized below:

	<u>2022</u>	<u>2021</u>
Balance, beginning of year	\$11,278,630	\$11,879,883
Funding received related to the acquisition of tangible capital assets, assets under capital lease and intangible asset	2,535,526	2,150,573
Amortization of program and operating assets	<u>(2,890,318)</u>	<u>(2,751,826)</u>
Balance, end of year	<u>\$10,923,838</u>	<u>\$11,278,630</u>

CANARIE Inc.
Notes to Financial Statements

March 31, 2022

8. Obligations Under Capital Leases

	<u>2022</u>	<u>2021</u>
Capital lease for infeasible rights of use of fibre, renewed, 3.00%, due March 2032, payable by monthly installments of \$23,825, principal and interest.	\$ 2,256,480	\$ 697,052
Capital lease for infeasible rights of use of fibre, 3.83%, due April 2025, payable by 3 installments of \$201,870, \$278,646 and \$1,985,636, principal and interest.	2,218,832	-
	4,475,312	697,052
Less: current portion	<u>222,114</u>	<u>244,082</u>
	<u>\$ 4,253,198</u>	<u>\$ 452,970</u>

Minimum lease payments required under the capital lease are as follows:

2024	\$ 487,769
2025	564,544
2026	2,271,535
2027	285,898
Subsequently	<u>1,429,491</u>
	5,039,237
Less: interest included in minimum payments	<u>563,925</u>
	<u>\$ 4,475,312</u>

CANARIE Inc.
Notes to Financial Statements

March 31, 2022

9. Commitments

On November 20, 2019, the organization entered into a new lease agreement for a office space commencing on April 1, 2020, which expires March 31, 2025. Future minimum annual lease payments under this operating lease (which includes base rent and the current charge for additional rent) for the premise are due as follows:

2023	\$ 619,094
2024	619,094
2025	<u>619,094</u>
	<u>\$ 1,857,282</u>

As at March 31, 2022, the organization had commitments of \$11,589,287 with respect to its programs.

10. Internally Restricted Net Assets

Royalty Fund

During the 2007/2008 fiscal year, Industry Canada granted the organization the authority to retain royalties collected after March 31, 2007 and to use these funds in a manner to be determined by the organization and its legal counsel. Annual allocations to the fund include investment income of \$4,802 (2021 - \$29,190). Disbursements from the fund represent payments to approved funded projects. The fund cannot be reallocated without the approval of the Board of Directors.

Windup of Operations

During the 1998 fiscal year, the organization established a fund for the eventual wind up of its operations or for the transition to a new mode of business. In either event, the fund will be used to cover outstanding operating expenses and obligations should a wind up or transition occur. Management performs an annual review of the sufficiency of this fund. Annual allocations to the fund include investment income of \$10,130 (2021 - \$59,213). At March 31, 2022, the organization transferred \$300,000 from its unrestricted net assets to Windup of Operations to maintain the fund. The fund cannot be reallocated without the approval of the Board of Directors.

CANARIE Inc.
Notes to Financial Statements

March 31, 2022

11. Economic Dependence

On July 6, 2019, ISED entered into a contribution agreement with the organization to contribute funding totalling \$137,000,000 from April 1, 2020 to March 31, 2024. Of the total contribution, \$30,200,000 was received in fiscal 2021 and \$28,700,000 was received in fiscal 2022.

12. Financial Instruments

Interest rate risk

Interest rate risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market interest rates. Fixed rate instruments subject the organization to a fair value risk while variable rate instruments subject it to a cash flow risk. The organization is exposed to this risk for its short-term investments. The risk associated with investments is reduced to a minimum since these assets are invested in short-term maturities.

13. Comparative Information

The comparative information has been reclassified where applicable to conform to the financial statement presentation used in the current year.

14. Statement of Cash Flows

Investing and financing activities that do not have a direct impact on current cash flows are excluded from the statement of cash flows. The following summarizes significant non-cash transactions during the year:

	<u>2022</u>	2021
Acquisition of assets under capital lease	\$(3,778,259) \$	-
Increase in obligations under capital leases	\$ 3,778,259 \$	-
