Management discussion and analysis of financial condition and results of operations for the three and six month periods ended December 31, 2022
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INTRODUCTION

As used in this Management Discussion and Analysis ("MD&A"), unless the context indicates or requires otherwise, all references to the "Company", "Sangoma", "we", "us", or "our" refer to Sangoma Technologies Corporation, together with our subsidiaries, on a consolidated basis as constituted on December 31, 2022. The MD&A compares the financial results for the three and six month periods of 2023 with those of the same periods in the previous year. This MD&A should be read in conjunction with Sangoma’s audited annual consolidated financial statements and related notes for the year ended June 30, 2022 ("Financial Statements"), which have been prepared in accordance with International Financial Reporting Standards ("IFRS"). All amounts are in millions of United States dollars except where otherwise indicated.

Additional information about us, including copies of our continuous disclosure materials, is available on our website at www.sangoma.com, through the EDGAR website at www.sec.gov or through the SEDAR website at www.sedar.com.

This MD&A is dated as of February 9, 2023.

NON-IFRS MEASURES

This MD&A contains references to certain non-IFRS financial measures such as Adjusted Operating Income, Adjusted EBITDA and Adjusted Cash Flow. Non-IFRS financial measures are used by management to evaluate the performance of the Company and do not have any meaning prescribed by IFRS and therefore may not be comparable to similar measures presented by other reporting issuers. Non-IFRS financial measures used herein have been applied on a consistent basis. “Adjusted Operating Income (Loss)” means IFRS income (loss) before interest expense (net), business integration costs, exchange listing expense, change in fair value of consideration payable, business acquisition costs, goodwill impairment and income taxes. “Adjusted EBITDA” means earnings before income taxes, interest expense (net), share-based compensation, depreciation (including for right-of-use assets), amortization, business integration costs, exchange listing expense, business acquisition costs, goodwill impairment and change in fair value of consideration payable. Adjusted EBITDA is a measure used by many investors to compare issuers. “Adjusted Cash Flow” means net cash flows from operating activities as defined by IFRS less the capitalized development costs that Sangoma amortized during the period, plus interest expense (net), business acquisition costs paid, business integration costs, and exchange listing expense. We believe that Adjusted Operating Income (Loss), Adjusted EBITDA and Adjusted Cash Flow are useful supplemental information as they provide an indication of the results generated by the Company's main business activities before taking into consideration how they are financed, taxed, depreciated or amortized. Investors are cautioned that non-IFRS financial measures, such as those presented herein, should not be construed as an alternative to net income or cash flow determined in accordance with IFRS. The reconciliation of the closest IFRS measure to each non-IFRS measure is set out on pages 13, 17, and 18 herein.

FORWARD-LOOKING STATEMENTS

This MD&A contains forward-looking statements, including statements regarding the expected fiscal 2023 financial results and the future success of our business, development strategies and future opportunities.
Forward-looking statements are provided for the purpose of presenting information about management’s current expectations and plans relating to the future and readers are cautioned that such statements may not be appropriate for other purposes. Forward-looking statements include, but are not limited to, statements relating to management’s guidance on revenue and Adjusted EBITDA, statements relating to expected inventory levels, statements relating to future lease and interest payments, statements relating to the impact of the continuing COVID-19 pandemic, statements concerning estimates of expected expenditures, statements relating to expected future production and cash flows, and other statements which are not historical facts. When used in this document, the words such as “could”, “plan”, “estimate”, “expect”, “intend”, “may”, “potential”, “should” and similar expressions indicate forward-looking statements.

Although Sangoma believes that its expectations reflected in these forward-looking statements are reasonable, such statements involve risks and uncertainties and no assurance can be given that actual results will be consistent with these forward-looking statements. Forward-looking statements are based on the opinions and estimates of management at the date that the statements are made, and are subject to a variety of risks and uncertainties and other factors that could cause actual events or results to differ materially from those projected in forward-looking statements.

Readers are cautioned not to place undue reliance on forward-looking statements, as there can be no assurance that the plans, intentions or expectations upon which they are based will occur. By their nature, forward-looking statements involve numerous assumptions, known and unknown risks and uncertainties, both general and specific, that contribute to the possibility that the predictions, forecasts, projections and other events contemplated by the forward-looking statements will not occur. Although Sangoma believes that the expectations represented by such forward-looking statements are reasonable, there can be no assurance that such expectations will prove to be correct as these expectations are inherently subject to business, economic and competitive uncertainties and contingencies. Some of the risks and other factors which could cause results to differ materially from those expressed in the forward-looking statements contained herein include, but are not limited to, risks and uncertainties associated with the integration of NetFortris Corporation (“NetFortris”), the remediation of material weakness identified in our internal control over financial reporting, the impact of the continuing COVID-19 pandemic, changes in exchange rate between the United States dollar and other currencies, expectations regarding the amount or frequency of impairment losses, including as a result of the write-down of intangible assets, including changes in technology, changes in the business climate, changes in the regulatory environment, the decline in the importance of the PSTN, new competitive pressures, the impact of global supply chain delays, the retention of key staff, the increase in cost and availability of our components and materials, and the impact of changes to interest rates and the other risk factors described in our most recently filed Annual Information Form for the fiscal year ended June 30, 2022. See also “Guidance” and “Controls and Procedures” below for more information on certain of these risks and uncertainties.

The forward-looking statements contained in this management’s discussion and analysis are expressly qualified by this cautionary statement. Sangoma undertakes no obligation to update forward-looking statements if circumstances or management’s estimates or opinions should change except as required by law.

**OVERVIEW**

Sangoma’s products and services are used by leading companies throughout the world and in leading UC, PBX, IVR, contact center, carrier networks, and data communication applications worldwide. Sangoma’s portfolio of products also enable service providers, carriers, enterprises,
SMBs, and OEMs alike to leverage their existing infrastructure for maximum financial return, while still delivering the most advanced applications and services from the latest technologies available. Please refer to the Glossary of Terms for detailed definitions of terms used throughout this MD&A.

Communications as a Service (CaaS) Portfolio

Sangoma is a trusted leader in delivering value-based Communications as a Service solutions for businesses of all sizes. The value-based communications segment includes small businesses to large enterprises who are looking for all the advantages of cloud-based communications at a fair price. Sangoma’s current Communications as a Service offerings are typically offered with monthly, yearly, or multi-year contracts and include:

- Unified Communications as a Service (“UCaaS”)
- Trunking as a Service (“TaaS”)
- Contact Center as a Service (“CCaaS”)
- Communications Platform as a Service (“CPaaS”)
- Video Meetings as a Service (“MaaS”)
- Collaboration as a Service (“Collab aaS”)
- Desktop as a Service (“DaaS”)
- Access Control as a Service (“ACaaS”)

Unified Communications as a Service (UCaaS)

Sangoma’s UC solutions are business communication systems (PBX’s with advanced UC features, such as presence/chat, conferencing, mobility, fax, and more) that can be deployed on-premise or hosted in the Cloud, allowing businesses to select the best option for their needs. Unified Communication systems, because of their mobility features such as having the business phone number ring on an app on your smartphone and/or desktop and instant messaging capability, enable remote work and work from home much more efficiently. Sangoma’s Unified Communication solutions fully integrate with our phones, soft clients, and network interoperability products to provide a fully interoperable solution from a single vendor.

Cloud-Based Business Phone Solution

Sangoma offers its customers full-scale cloud-based Unified Communications solutions. With Sangoma, businesses can get contact center, mobility, softphone, call control, and productivity features included for every user at a reasonable price. Sangoma’s hosted phone service delivers the customer experience businesses demand at an affordable price point. Customers can also choose pre-provisioned phones that customers simply plug into their network.

On-Premise Business Phone Solution

Sangoma also offers the more traditional on-premise UC phone system, for businesses still wanting to deploy their business phone system on premise. Whether deployed on a dedicated appliance or in the customer’s virtual environment, Sangoma provides the power and connectivity necessary.

IP Deskphones, Headsets and UC Clients: Sangoma provides desktop and softphone collaboration clients that integrate seamlessly with our UC solution offerings and deliver UC features (presence, contacts, chat, calling, audio and video conferencing, etc.) from a single application, on any device, at any location.

IP Deskphones: Sangoma offers a full line of phones that work with both our cloud and
on-premise systems that are perfect for every user type, from casual to call center to managers and executives. Sangoma’s product line includes entry-level, mid-range, and executive-level phones. All models include HD Voice and plug-and-play deployment. Sangoma’s range of IP phones are customized to seamlessly integrate with all of our UC Systems and provide zero touch installation, simplified system management, and instant access to a wide range of features.

Headsets: Sangoma also offers headsets that either work in conjunction with the desktop phones (by plugging into the phone) or work in conjunction to our desktop soft client (by plugging directly into the computer). These headsets enable roaming of up to 325 feet from the phone or desk computer.

UC Clients and Softphones: Unified Communication Clients (or softphones) are used to make or receive phone calls with your business phone number and can be used as your main phone or as an extension of your desk phone. They are available as an app on your smartphone or computer. These UC clients have enabled employees to work remote seamlessly by enabling phone calls to customers and other employees as if they were in a physical office. Sangoma offers UC clients with all of our Unified Communication / Business phone system product lines.

**Trunking as a Service (TaaS)**

SIP trunks deliver Internet-based telephony services to businesses using their existing internet connection, eliminating the need for separate traditional PSTN or digital telecom connections. SIP trunking is fast becoming the technology of choice to interconnect an IP PBX system to a telephone company. The main drivers are cost efficiencies (over fixed lines such as ISDN or analog lines from incumbent telcos) and end-to-end UC features/transport. Cost efficiencies are realized because SIP trunking uses already-available broadband connections at customer premises. Sangoma offers both retail and wholesale SIP Trunking which allows our customers to choose the service that best meets their needs. Either service offers DIDs and number porting.

**Retail SIP Trunking**

Retail SIP trunking offers predictable monthly expenses with pricing based per trunk. SIPStation, Sangoma’s retail SIP trunking service, is seamlessly integrated into our various UC platforms, making it easy to get up and running. It also includes an integrated fax service option, enabling a business to send and receive faxes from a web interface or from a local fax machine. Typically, small to mid-sized businesses and enterprises would utilize this type of service.

**Wholesale SIP Trunking**

Sangoma’s wholesale SIP trunking offer is now available following the acquisition of VoIP Innovations. Pricing for wholesale SIP trunking is usage-based but with a larger monthly minimum commitment. This includes origination, termination, SMS/MMS, e911, and fraud mitigation. Typically, very large businesses or service providers who resell SIP trunks would utilize this type of service.

**Fax as a Service**

Faxing remains an important communications tool, yet VoIP networks are sometimes unable to send faxes reliably because fax standards are based on very specific timing that can be interrupted in VoIP systems, especially where there is substantial latency. Sangoma’s FoIP service, FaxStation, is a hosted service to remedy this problem, available with our TaaS. It features a
telecom appliance with up to four analog connections for fax machines and operates in concert with Sangoma’s fax server data center to encrypt and package the fax communication to make it fail-safe. This is particularly useful for small businesses that rely on fax communications but also for industries with challenging network conditions, such as mining, oil rigs, and ship-to-shore over satellite.

**Contact Center as a Service (CCaaS)**

Contact Center as a Service (CCaaS) is our cloud-based contact center, or customer experience, offering. It provides robust contact center capabilities running in various ways: either standalone, in conjunction with our other cloud services (such as UCaaS), or integrated “inside” our UCaaS product in a simplified version. This latter solution is intended for ‘departmental’ type usage, by companies that are not pure-play contact centers, but that might have a department such as customer service or technical support that operate inside that company almost like a mini contact center.

**Communications Platform as a Service (CPaaS)**

Communications Platform as a Service (CPaaS) allows developers to easily build services and applications using real-time communication features, such as voice, video, chat, and SMS, via the cloud. Our platform enables Sangoma, our integrator/developer partners, and advanced customers to build new communications services based on voice, rest APIs, WebRTC, and SMS. When running an application on a CPaaS platform, performance is critical. To ensure peak performance, Sangoma offers its own SIP trunking service, providing optimized connectivity in addition to easy access to phone numbers. Sangoma also sells a series of ‘applications’ (or Apps) based upon our CPaaS product that customers can purchase.

**Video Meetings as a Service (MaaS)**

Sangoma Meet is our video meetings, cloud-based service accessible from any device, be it desktop or mobile. It enables file sharing on screen so collaboration with co-workers is enhanced, integrates seamlessly with your calendar, and enables PSTN phone calls. Sangoma Meet is available in free and chargeable tiers.

**Collaboration as a Service (Collab aaS)**

Collaboration as a Service (Collab aaS) is Sangoma’s cloud-based offering for enabling people to work together more productively. This service is called TeamHub. It allows users to interact using any of the various forms of communications, including chatting, calling, and video. TeamHub integrates Sangoma’s softphone client software applications (desktop and mobile) and is designed to allow communications to start in one mode (such as chat), and move through different modes very elegantly, in effect ‘upgrading’ that mode of communications to a voice call in real time, and/or upgrading that voice call to a video meeting.

**Desktop as a Service (DaaS)**

Sangoma’s Desktop as a Service helps companies adapt to today’s modern, flexible, and remote workforce. It is the most secure method for staff to access their tools and applications from any location to do their work, delivers simplified IT administration and cuts down on the CapEx of deploying PCs. Sangoma is one of the only companies that can offer communications capability inside a DaaS product.
**Access Control as a Service (ACaaS)**

At Sangoma, this product offering is called SmartOffice Access. The SmartOffice product line is to be a family of IoT based services, and it was launched first with Access Control. Access Control is a means of controlling access to one’s office or parts of an office and was traditionally done via the well-known white ‘swipe cards’ or fobs. Sangoma is innovating in that space by eliminating the need for such older technologies and extending our experience with mobile apps that so many of our customers and their employees already get from us, as a Softphone. This new mobile allows one to open doors using your smartphone and the app from Sangoma, wirelessly using IoT protocols. No more swipe cards, no more readers, no more wiring behind the walls. This is one of Sangoma’s first forays into cloud services that extend our CaaS suite beyond the strict definition of ‘communications’.

**MSP Portfolio**

Sangoma’s cloud-based Managed Service Provider (“MSP”) offerings deliver mission critical communication services that businesses need and complement our full line of Communications as a Service solutions. The MSP product line is built upon a tightly integrated, enterprise grade, and end-to-end managed network, which is all supported by an expert 24/7 network engineering team. The current MSP offering includes three primary services:

Managed Security: Sangoma provides a cloud-based service, sometimes called Unified Threat Management (“UTM”), whereby the customers network, including voice and data traffic, are secured by intrusion prevention and detection capabilities. The network security service helps protect customers against attacks and data losses from spam, viruses, ransomware, botnets, etc.

Managed SD-WAN: Sangoma offers a cloud-based software-defined approach to managing a customers wide area network. The SD-WAN service enables network redundancy through the ability to manage multiple internet connections from multiple providers, which is seen as one seamless connection for the customer. If one connection fails, the customer does not lose connectivity and has uninterrupted uptime. The service also provides traffic shaping whereby certain types of traffic can be given priority or forced in priority.

Managed Access: Sangoma also provides a robust broadband connectivity solution, including network monitoring, analytics, backup, and a fully PCI-compliant offering for payment card and credit card transactions. Additionally, our Managed Access solution integrates with Managed Security and Managed SD-WAN services, delivering unique capabilities such as secure, end-to-end peering connections to critical destinations (such as Public Cloud sites like AWS and Azure) and Quality of Service commitments.

**Network Interconnection Products**

In addition to the CaaS and MSP offerings described above, Sangoma also offers network interconnection products. These products connect different types of networks together, such as VoIP networks to PSTN networks, or VoIP networks to mobile networks or different types of VoIP networks.

**Session Border Controllers (SBCs)**
Anytime two VoIP networks interconnect, issues of security and interoperability arise. SBCs can manage these issues, including provider-to-provider connections, provider-to-enterprise connections, and enterprise-to-enterprise connections. Sangoma’s SBCs are available as hardware appliances, as software-only solutions running on a virtual machine in hosted environments, or as a hybrid of both. The hybrid solution is unique to Sangoma and provides all the flexibility expected from virtual machine capability coupled with the scalability that is found in hardware-based solutions. Sangoma’s SBCs have broad interoperability certifications.

VoIP Gateways

VoIP gateways are needed any time voice traffic moves from a VoIP network to a traditional PSTN telephone network. As the traffic traverses these networks, there are issues that need to be resolved regarding both the media (the sound of the caller’s voice) and the signaling (the method used to control the media traveling over that connection).

In a service provider or carrier network, much larger gateways perform these same tasks. In addition, there are signaling protocols that are only used when carrier networks communicate with other carrier networks that are not included in the enterprise product line.

All Sangoma’s gateways have broad interoperability certifications.

PSTN Interface and Media Processing Boards

Sangoma’s complete line of boards connect and interface to the PSTN. Even though IP networks are growing and quickly becoming the standard, the PSTN still exists, and new communication solutions often need to connect to the PSTN. These boards are primarily used by communications solution developers in PC/Server based telecommunications systems that connect to the PSTN. They perform a very similar task to VoIP gateways, but are installed inside the server rather than being stand-alone devices. By providing customers with the option of using a PSTN interface board or a VoIP gateway, Sangoma maximizes flexibility based on installation requirements, particularly when space and power are at a premium. They may also be used in harsh conditions that require ruggedized servers.

Open-Source Software Products

Asterisk and FreePBX

Sangoma is the primary developer and sponsor of the Asterisk project, the world’s most widely used open-source communications software, and the FreePBX project, the world’s most widely used open-source PBX software.

Sangoma also offers revenue-generating products and services, beyond the open-source Asterisk or FreePBX software, to users of these open-source software projects. The types of products and services Sangoma offers includes software add-ons to Asterisk or FreePBX, IP phones, SIP trunking, cloud-based fax, training, technical support, maintenance, PSTN cards, VoIP gateways, session border controllers, and commercial/hardened versions of the PBX/UC software.
OVERALL PERFORMANCE

Operational

Sangoma Technologies is a trusted leader in delivering cloud-based CaaS and MSP solutions for businesses of all sizes. Customers include companies from small/medium businesses (SMB’s) right up to large enterprises who are looking for all the advantages of cloud-based communications and managed network services at a fair price. In addition to those cloud-based Services, Sangoma also has a broad suite of Products to complement its Services.

Enterprises, SMBs and carriers in over 150 countries rely on Sangoma’s technology as part of their mission-critical infrastructures. Through a worldwide network of distribution partners, Sangoma delivers high-quality services and products, some of which carry the industry’s first lifetime warranty.

Sangoma has always been operated and managed as a single economic entity. There is one management team that directs the activities of all aspects of the Company and it is managed globally by our executive team. As a result, we believe that we have one reporting segment, being the consolidated Company. Over time, this may change as the Company grows and when this occurs, we will reflect the change in our reporting practice.

Revenue

Sangoma primarily generates revenue from Services and Products. Our Services revenue is generated primarily from customers entering recurring revenue agreements. Product revenues are comprised of the sale of products and services that generate non-recurring revenue.

Innovation

As a technology company, Sangoma is continuously working on a large number of projects across its broad portfolio of existing products and services. While the Company has introduced several new additions to its portfolio over the last few years, the majority of the Company’s investment in Research and Development (“R&D”) is dedicated to sustaining, improving on and enhancing its broad portfolio of existing products and services. Sangoma believes that innovation is essential to a technology company’s future. The Company also believes that R&D investment is necessary in order to address the needs of the Company’s wide-ranging group of customers (which include business of all sizes including service providers, enterprises, small-medium sized businesses, and original equipment manufacturers) in over 150 countries, to keep pace with technology developments in the cloud communications industry, to meaningfully compete in that industry, and to achieve and maintain market acceptance.

The Company focuses on creating and introducing products to the market as soon as commercially practical and, thereafter, focuses on enhancements to further improve its products. Such product introductions enable the Company to validate product acceptance to some degree, and to get products to market efficiently to start generating revenue. Furthermore, the Company focuses on keeping its product development costs for new projects under control in a number of ways, including by reusing its existing code base where applicable and by leveraging open-source software.

Sangoma continues to invest in R&D to develop new products and to improve existing offerings with spending on R&D increasing each year.
Sales and marketing

R&D is important, but without Sales and Marketing, customers can be too unaware of the advancements that Sangoma has made in innovation. So, Sangoma continues to increase its investment in both Sales and in Marketing, to promote awareness of the Company, to communicate the critical shift from single products to full solutions to cloud, and to drive customer acquisition.

Sales

Sangoma uses a dual sales path ‘go to market’ approach: direct sales to some of our largest customers and indirect distribution to most of our other clients.

- **Direct Sales** is typically used for selling to ‘service providers’, OEMs and large enterprise type businesses.

  Service Providers is a broad category of customers that included telcos, ISPs, ITSPs, wireless/mobile operators, MSPs, UCaaS operators, etc. These types of organizations are potential customers for Sangoma.

  OEM partners are companies that ‘design in’ Sangoma products as a component of their solutions. OEM customers tend to be committed participants in their given markets and have longer-term focus. It is important to reach these potential customers in the early days of any project to secure ‘design wins’ and to have sales and marketing programs that will ensure close collaboration during product and sales development cycles.

  Enterprise customers are the classic ‘larger’ companies who buy products or services for their own use. This type of customer has similar ‘use cases’ to a SMB type customer but is large enough that some prefer to do business directly with Sangoma, the Company often wants a direct relationship with them as well, and they are buying enough for Sangoma to cost effectively service them directly.

- **Indirect Sales**: In most cases, Sangoma uses the indirect or channel model. We value the ‘multiplier effect’ of a channel model (i.e., one of our salespeople sells to dozens of partners who sell to hundreds/thousands of customers), the more ‘local nature’ of a channel partner who is often based quite near to their end customers, and the more cost-effective structure of indirect distribution in a typical sales cycle. In such cases, Sangoma utilizes this indirect distribution model to reach the full breadth of customers, often based upon a two-tier Channel model:

  The ‘upper tier’ of the indirect model is typically made up of Distributors or Master Agents, who normally sell not to the end customer, but to the ‘second tier’ of the channel. Master Agents are now sometimes called Technology Service Brokers or Telecom Solution Distributors. This upper tier of the channel tends to be larger organizations and cover broader geographic regions.

  The ‘second tier’ of the indirect model is normally made up of Resellers and Agents. Distributors typically sell to resellers, and Master Agents typically sell to Agents. The Resellers and Agents then sell to end users (with some performing other ancillary services such as installation and/or support). The second tier tend to be smaller organizations (though not always) and are usually more ‘local’ in nature.
Sangoma has parts of its sales team that focus on Direct customers, whereas the majority focuses on the Channel. In the Channel, partners require frequent attention to keep Sangoma ‘on their mind’ in a crowded product marketplace. Therefore, a portion of the Channel sales team services the distributors and master agents as the upper tier of the channel, while a different part of the team focuses on the resellers/agents. Finally, Sangoma has professional sales teams across all our key geographic regions as well.

Marketing

Sangoma also continues to increase its efforts in marketing. The Company has assembled corporate marketing programs with two key objectives in mind:

- to promote the Sangoma brand and positioning, which included conveying the message about the Company’s full solutions and its Cloud-First approach.
- leads generation as one of the front-end steps in customer acquisition.

Sangoma is now using various marketing techniques typical of technology firms to accomplish those two objectives. This includes participation in tradeshows, speaking at selected industry events, attending specialized seminars run by Sangoma’s distribution channel and other partners, investing in electronic marketing strategies (e.g., web presence, social media and blogging, online advertising, search engine campaigns, etc.), conducting lead generation campaigns via email/social media/etc., webinars, creating thought leadership pieces, PR, etc.

In addition to the overall corporate messaging, in support of the above two objectives, Sangoma has developed a comprehensive set of channel promotion programs, aimed at the Company’s indirect partners described above, both distributors/master agents as well as resellers/agents. The Company seeks to attract new channel partners and to grow the business with existing partners. Sangoma has implemented several incentive programs to reward its channel partners for performance and behaviours that Sangoma believes will grow revenues.
RESULTS OF OPERATIONS

All amounts are in millions of United States dollars except where otherwise indicated.

SUMMARY

The following table outlines our unaudited consolidated interim statements of loss and comprehensive loss for the periods indicated:

<table>
<thead>
<tr>
<th></th>
<th>Three month periods ended</th>
<th>Six month periods ended</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>December 31</td>
<td>December 31</td>
</tr>
<tr>
<td></td>
<td>2022</td>
<td>2021</td>
</tr>
<tr>
<td>Revenue</td>
<td>$62.04</td>
<td>$53.19</td>
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<tr>
<td>Cost of sales</td>
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<td>$14.84</td>
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<tr>
<td>Gross profit</td>
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<td>$38.35</td>
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<tr>
<td>Expenses</td>
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<tr>
<td>Sales and marketing</td>
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<td>$13.20</td>
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<tr>
<td>Research and development</td>
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<tr>
<td>General and administration</td>
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<tr>
<td>Foreign currency exchange (impact loss)</td>
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<tr>
<td>Interest income</td>
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<tr>
<td>Interest expense</td>
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<td>$0.60</td>
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<tr>
<td>Business integration costs</td>
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<td>$0.25</td>
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<tr>
<td>Exchange gains</td>
<td>$0.67</td>
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<tr>
<td>(Gain) loss on derivative instrument at fair value of consideration payable</td>
<td>$(0.35)</td>
<td>$(0.19)</td>
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<tr>
<td>Loss before interest income net, business integration costs, and income taxes</td>
<td>$(1.83)</td>
<td>$1.51</td>
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<tr>
<td>Interest income</td>
<td>$0.19</td>
<td>$(2.30)</td>
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<td>Provision for income taxes</td>
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<td>Deferred tax</td>
<td>$(1.32)</td>
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<td>Net loss</td>
<td>$(2.73)</td>
<td>$(2.48)</td>
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<tr>
<td>Other comprehensive income (loss)</td>
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<tr>
<td>Change in fair value of interest rate swap, net of tax</td>
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<td>Comprehensive loss</td>
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<td>Loss per share</td>
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<tr>
<td>Basic</td>
<td>$(0.004)</td>
<td>$(0.007)</td>
</tr>
<tr>
<td>Diluted</td>
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<tr>
<td>Weighted average number of shares (thousands)</td>
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<tr>
<td>Basic</td>
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<td>Diluted</td>
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<td>31,726</td>
</tr>
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</table>

REVIEW OF OPERATIONS

Revenue

Sales for the three and six month periods ended December 31, 2022 were $62.04 and $126.09 million, up 17% and 20% from the $53.19 and $104.69 million in the comparable periods of fiscal 2022.

The revenue increase in both periods primarily resulted from the NetFortris acquisition and our existing Services business continuing to grow and compound. As a result, our Services revenue
represented approximately 80% of total revenue this quarter, up from 69% in the same quarter of the prior year, and consistent with our strategic objective.

When compared sequentially, our revenue was down 3% from $64.05 million in the first quarter of fiscal 2023. This decrease is due primarily to the softness in Product sales this quarter, as customers continue to be more sensitive to Capex purchases (given current economic headwinds), to the supply chain conditions, and the impact of a strong US dollar exchange rate on some international order flow.

Cost of revenue and gross profit

The cost of sales for the three months ended December 31, 2022 increased by 30% to $19.25 million compared to $14.84 million in the equivalent period of the prior year, and increased by 36% to $39.96 million for the six months ended December 31, 2022 as compared to $29.47 million in the equivalent period of the prior year. The period over period increases in cost of sales was driven primarily by the addition of the NetFortris business and by the continuing supply chain pressures. Sangoma’s cost of sales has been impacted by global supply chain disruptions, for both electronic components and for shipping. In some cases, Sangoma has needed to order further ahead, pay more for electronic components, and to ship product by air versus by sea (at higher cost). Nevertheless, Sangoma was able to fill most customer orders in the second quarter, despite these supply chain pressures.

Gross profit for the three months ended December 31, 2022 was $42.79 million, up 12% from the $38.35 million realized in the equivalent period of the prior year and was $86.13 million for the six months ended December 31, 2022, up 15% from the $75.22 million realized in the equivalent period of the prior year. Gross margin for the second quarter of fiscal 2023 was approximately 69% of revenue. This is down slightly from the same quarter last year partly because of the global supply chain pressures referenced and partly due to the slightly lower average margin from the Managed Services products. This level of gross margin is at the upper end of our expectations for fiscal year 2023.

Operational expense

As permitted under IFRS, costs are allocated by function except for the impact of foreign exchange, which can result in swings between time periods.

Sales and marketing
Sales and marketing expense was $15.61 million for the second quarter of fiscal 2023, an increase from the $13.20 million incurred in the same quarter of fiscal 2022, but the same as a percentage of revenue at approximately 25%. For the first two quarters of fiscal 2023, it was $31.26 million, an increase from the $25.31 million in the equivalent period of the prior year. The increase over both periods is primarily the impact of the addition of the NetFortris sales and marketing expense.

**Research and development**

A portion of the Company’s R&D costs are capitalized each period and amortized on a straight-line basis over three years (see the audited consolidated financial statements and related notes for the fiscal year ended June 30, 2022, available at www.sedar.com and www.sec.gov).

The research and development expenses incurred, and the development costs amortized during the three and six month periods ended December 31, 2022 were $9.23 million and $18.66 million respectively. This was higher than the $7.76 million and $16.12 million incurred in the equivalent periods of the prior year, mostly as a result of the addition of the NetFortris development team, but the same as a percentage of revenue at approximately 15%. For the quarter ended December 31, 2022, the Company did not have any significant projects that have not yet generated revenue, nor did it have any products or services that are not fully developed, and which are material to the Company.

**General and administration**

General and administration expenses were $19.52 million for the three month period ended December 31, 2022 and $38.81 million for the six month period ended December 31, 2022, compared to $18.15 million and $35.42 million in the same periods of fiscal 2022. The increased spending over both periods is driven primarily by the addition of the NetFortris team and the non-cash expense of the additional amortization of the intangible assets acquired. The Company’s general and administration expenses decreased as a percentage of revenue from approximately 34% in the second quarter of fiscal 2022 to approximately 31% in the second quarter of fiscal 2023.

**Foreign exchange**

Foreign exchange loss for the three and six month periods ended December 31, 2022 was $0.10 and $0.06 million, compared to a gain of $0.08 million and $0.07 million in the comparable periods of fiscal 2022.

**Total expenses**

Total operating expense for the three months ended December 31, 2022 was $44.26 million versus $39.19 million during the equivalent period of the prior year and $88.67 million for the six months ended December 31, 2022 compared to $76.92 million during the equivalent period of the prior year. The primary driver of the increase was the incremental expense associated with the addition of the NetFortris business, partly offset by cost savings from the integration which began in the fourth quarter of fiscal 2022 and carried through the first six months of fiscal 2023. Overall, total operating expenses increased by 13% year-over-year this quarter, whereas revenue was up by 17%, consistent with Sangoma’s long term approach of growing expenses at a slower rate than revenue, demonstrating our operating leverage. The Company’s total operating expense for the second quarter represented approximately 71% of revenue, a decrease from approximately 74% in the same period last year, again reflecting operating leverage and prudent management.
Adjusted Operating Loss

Adjusted Operating Loss for the quarter ended December 31, 2022 was $1.47 million, higher than the loss of $0.84 million in the same period last year, due to the above factors.

Interest

Net interest expense for the quarter ended December 31, 2022 was $1.63 million, higher than the $0.60 million in the same period last year, primarily due to the additional interest expense on the new debt from the acquisition of NetFortris, the non-cash accretion expense associated with the consideration payable and from the increases in prevailing interest rates.

Business acquisition costs

There were no business acquisition costs incurred in the quarter ended December 31, 2022 or in the same period last year.

Business integration costs

For the second quarter of fiscal year 2023, Sangoma recorded $0.35 million of costs directly associated with the reduction of staff between the two companies following the NetFortris acquisition. There were no integration costs in the same period of the prior year. The Company does not anticipate any additional costs in the third quarter of fiscal year 2023.

Consideration payable

As part of the agreement for the purchase of Star2Star, Sangoma processes certain payroll transactions for Star2Star Holdings (“Holdings”) option holders each time an instalment of the remaining share consideration is distributed. This gives rise to a tax deduction for Sangoma, the benefit of which is paid to Holdings when it is realized by Sangoma. To account for this, the estimated amount is calculated each quarter and recorded as a deferred tax asset, with the associated liability to Holdings recorded as consideration payable. The amount of the potential payment is tied to Sangoma’s share price, the US to Canadian dollar exchange rate and the current US tax rate. As this changes, the Company will update the potential payout. As of December 31, 2022, the changes in these factors gave rise to a decrease in the consideration payable as compared to the amount established at June 30, 2022. An equivalent offset is included in deferred tax expense. There is no cash exposure to Sangoma since the payment is only due when the tax benefit is actually realized, and the two balances will largely offset each other over time.

Net loss

Net loss for the second quarter was $2.73 million ($0.084 loss per share fully diluted), compared to a net loss of $2.48 million ($0.078 loss per share fully diluted) for the equivalent quarter of the prior year.
Adjusted EBITDA

The derivation of Adjusted EBITDA and the reconciliation of net income to Adjusted EBITDA for the comparable quarter and each fiscal year is shown in the table below.

For the three and six month periods ended December 31, 2022, Adjusted EBITDA at $10.55 million and $21.29, respectively, was up from $10.43 million and $20.52 million in the equivalent periods of the prior year, primarily resulting from the addition of NetFortris, the underlying growth in our Services business, and the cost restructuring as part of the integration of NetFortris.

QUARTERLY RESULTS OF OPERATIONS

Sangoma’s quarterly revenue has now exceeded the same period in the prior year for each of the last 29 quarters. Selected financial information over the prior eight quarters is shown in the table below.

Sales and Net Income by Quarter

Revenues over the comparative periods have been positively impacted by the acquisitions of NetFortris in March 2022, the acquisition of Star2Star in March 2021, the organic growth within the existing Services business, as well as an uptick in some quarters for the Product business. The most recent two quarters have seen a decline in the Product business, resulting in a slight decrease in revenue during those periods, due to the reasons outlined earlier, namely customers continue to be more sensitive to Capex purchases (given current economic headwinds), to the supply chain conditions, and the impact of a strong US dollar exchange rate on some international order flow.
In line with revenue, cost of sales, gross profit, operating expenses, and Adjusted EBITDA have all increased over the comparable periods. In addition, cost of goods has been impacted by the related global supply chain pressures, for both electronic components and for shipping. In some cases, Sangoma has needed to order further ahead, pay more for electronic components, and to ship product by air versus by sea at higher cost.

**LIQUIDITY AND CAPITAL RESOURCES**

As of December 31, 2022, Sangoma had current assets of $55.21 million and current liabilities of $71.14 million, compared with $60.31 million and $78.41 million at June 30, 2022, respectively. The decrease in assets is primarily a result of the repayment of debt and certain tax payments which were made in the first two quarters, while the decrease in liabilities is primarily a result of the repayment of debt.

The Company closed the second quarter with $6.80 million of cash compared to $12.70 million at June 30, 2022. The Company used a portion of its cash to continue paying down the debt associated with its most recent acquisition, investment in capitalized development costs, and in the share buyback program under our normal course issuer bid (the “NCIB”).

Trade receivables of $16.67 million on December 31, 2022, were slightly higher than the $16.05 million on June 30, 2022, primarily as a result of the addition of NetFortris and from the growth in our business, and down slightly from the immediately prior quarter when they were $17.22 million.

Inventories were $19.30 million on December 31, 2022, $1.87 million higher than the $17.43 million at June 30, 2022, primarily reflecting the inventory build undertaken to contend with the supply chain pressures described earlier, in combination with softer Product sales in the first two quarter of fiscal 2023.

Sangoma generated $4.77 million of Adjusted Cash Flow from operations during the second fiscal quarter of 2023 ended December 31, 2022, compared to $3.80 million in the same quarter last year. The reconciliation of net cash flows from operating activities to Adjusted Cash Flow for the three and six month periods of fiscal 2022 and 2023 are shown in the table below.

<table>
<thead>
<tr>
<th>Three month periods ended December 31</th>
<th>Six month periods ended December 31</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2022</td>
</tr>
<tr>
<td>Net cash flows from operating activities</td>
<td>4.96</td>
</tr>
<tr>
<td>Less capitalization of development costs</td>
<td>-1.87</td>
</tr>
<tr>
<td>Interest expense</td>
<td>1.33</td>
</tr>
<tr>
<td>Business integration costs</td>
<td>0.35</td>
</tr>
<tr>
<td>Exchange listing expense</td>
<td>-</td>
</tr>
<tr>
<td>Adjusted cash flow from operations</td>
<td>4.77</td>
</tr>
</tbody>
</table>

There are no existing or anticipated defaults or arrears on lease payments or interest payments and Sangoma is in full compliance with all debt covenants. Management of the Company believes that the current working capital and expected funds generated from operations will be sufficient to meet the operating and planned capital expenditures of the Company for the foreseeable future.

**Credit Facility**
On October 18, 2019, the Company entered into a new credit agreement (the “Original Credit Agreement”) in favour of its subsidiaries, Sangoma Technologies Inc. and Sangoma US Inc. (the “Borrowers”) with *inter alia* The Toronto-Dominion Bank and The Bank of Montreal, as lenders (the “Lenders”). Under the terms of the Original Credit Agreement, the Lenders provided the Borrowers with a term loan facility to refinance the Company’s existing credit facilities and to fund part of the purchase of VI Acquisition.

On March 31, 2021, the Company entered into an amended and restated credit agreement (the “Amended and Restated Credit Agreement”) which amended and restated the Original Credit Agreement to allow the Company to fund part of the StarBlue Acquisition.

On March 28, 2022, the Company entered into the Second Amended and Restated Credit Agreement (the “Second Amended and Restated Credit Agreement”) which amended and restated the Amended and Restated Credit Agreement to allow the Company to fund part of the NetFortris Acquisition. The Second Amended and Restated Credit Agreement is comprised of: (i) a $6 million revolving credit facility, (ii) a $21.75 million term credit facility, which was used to partially fund the VI Acquisition (iii) a $45.94 million term credit facility, which was used to partially fund the StarBlue Acquisition, (iv) a $45 million term credit facility, which was used to partially fund the NetFortris Acquisition (the “Term 3 Facility”), and (v) a $1.5 million swingline credit facility.

On June 28, 2022, the Company entered into the first amendment to the Second Amended and Restated Credit Agreement to reflect certain administrative amendments and to amend the amount of the Term 3 Facility quarterly principal installments.

On October 19, 2022, the Company drew down $3 million from the revolving credit facility and as of December 31, 2022, the amount remains outstanding.

Under its Second Amended and Restated Credit Agreement with its lenders, the Company must satisfy certain financial covenants, principally in respect of total funded debt to earnings before interest, taxes and amortization, and debt service coverage ratio. As at December 31, 2022, the Company was in compliance with all covenants related to its Credit Agreement.

**CONTRACTUAL OBLIGATIONS**

The following table shows the movement in contractual liabilities from July 1, 2022 to December 31, 2022:
Commitments

The table below outlines our contractual commitments as of December 31, 2022:

<table>
<thead>
<tr>
<th>within 12 months</th>
<th>12-24 months</th>
<th>24-36 months</th>
<th>&gt;36 months</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts payable and accrued liabilities</td>
<td>23.82</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sales tax payable</td>
<td>5.76</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Consideration payable</td>
<td>10.25</td>
<td>0.63</td>
<td>0.63</td>
<td>0.25</td>
</tr>
<tr>
<td>Operating facility and loans</td>
<td>17.70</td>
<td>17.70</td>
<td>22.78</td>
<td>40.00</td>
</tr>
<tr>
<td>Lease obligations on right of use assets</td>
<td>3.56</td>
<td>3.10</td>
<td>2.72</td>
<td>8.45</td>
</tr>
<tr>
<td>Other non-current liabilities</td>
<td>-</td>
<td>-</td>
<td>1.00</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>61.09</strong></td>
<td><strong>21.43</strong></td>
<td><strong>26.13</strong></td>
<td><strong>50.30</strong></td>
</tr>
</tbody>
</table>

OFF-BALANCE SHEET ARRANGEMENTS

There are no off-balance sheet arrangements that have, or are reasonably likely to have, a current or future effect on the results of operations or financial condition of Sangoma.

RELATED PARTY TRANSACTIONS

Except as disclosed in the notes to the consolidated financial statements, the Company is not party to any material transactions with related parties.

CRITICAL ACCOUNTING POLICIES AND ESTIMATES

The preparation of our consolidated financial statements in conformity with IFRS requires management to make estimates and assumptions that affect the amounts reported in the consolidated financial statements and accompanying notes. We review these estimates on an ongoing basis based on management’s best knowledge of current events and actions that we may undertake in the future. Actual results could differ from these estimates. All significant estimates and critical judgments, estimates, and assumptions are described in Note 3 of the Company’s Financial Statements.
FINANCIAL INSTRUMENTS AND OTHER INSTRUMENTS

The fair values of the cash and cash equivalents, trade and other receivables, derivative assets, contract assets, other current assets, accounts payable and accrued liabilities, consideration payable and derivative liabilities approximate their carrying values due to the relatively short-term nature of these financial instruments or as these financial instruments are fair valued at each reporting period. The fair values of operating facility and loans approximate their carrying values due to variable interest loans or fixed rate loan, which represent market rate. Further details relating to our financial instruments, the risks associated with the financial instruments and how we manage those risks, are described in Note 4 of the Company’s Financial Statements.

SIGNIFICANT EVENTS

Normal Course Issuer Bid

In the fourth quarter of fiscal 2022, the Company announced its intention to make an NCIB with respect to its Shares. Pursuant to the NCIB, Sangoma may, during the 12-month period commencing June 23, 2022 and ending no later than June 22, 2023, purchase up to 1,071,981 shares, representing 5% of the total number of 21,439,632 Shares outstanding, through the facilities of the TSX, the Nasdaq Global Select Market or alternative Canadian trading systems. Sangoma also entered into an automatic share purchase plan with a designated broker to allow for the purchase of Shares under the NCIB at times when the Company would ordinarily not be permitted to purchase Shares due to self-imposed blackout periods, insider trading rules or otherwise.

Under the terms of the NCIB, during the six month period ended December 31, 2022, the Company purchased a total of 103,122 shares at an average price of $5.42 per share, for total consideration of $0.56 million.

OUTSTANDING SHARE INFORMATION

We are currently authorized to issue an unlimited number of shares. As of the date hereof, 23,038,226 shares, 911,902 stock options and 655,000 share units are issued and outstanding.

In accordance with the StarBlue share purchase agreement, 10,000,000 shares remain to be issued over the next three years. Following the remaining quarterly issuances of the StarBlue shares, the Company will have 33,036,578 shares outstanding.

GUIDANCE

On September 26, 2022 and November 10, 2022, the Company provided and maintained guidance for fiscal 2023 of revenue between $275 - $285 million and Adjusted EBITDA of $48 - $52 million. Given the results for the first two quarters of fiscal 2023 and the current assumptions as described below, including global economics, the Company is lowering its revenue guidance to $250 - $260 million and its Adjusted EBITDA guidance to $46 - $49 million.
The above outlook constitutes forward-looking information and is based on the Company’s assessment of many material assumptions, including:

- The Company’s ability to manage current supply chain constraints, including our ability to secure electronic components and parts, manufacturers being able to deliver ongoing quantities of finished products on schedule, no further material increases in cost for electronic components, and no significant delay or material increases in cost for shipping
- The revenue trends the Company experienced in fiscal year 2022 and fiscal 2023 to-date, the trends we expect going forward in fiscal 2023, and the impact of growing economic headwinds globally
- The continuing recovery of the global economy from the impact of COVID-19, including decreased government restrictions and increased customer demand, all of which would not be materially negatively affected by more recent macro factors such as inflation, interest rates, or recessions
- The successful integration of NetFortris, the achievement of post-closing synergies, and the ability to cross-sell NetFortris and Sangoma’s products and services to the other’s customer base
- The NetFortris business continuing to operate and generate results in a manner consistent with its business preceding its acquisition by the Company and as anticipated by us
- There being continuing growth in the global UCaaS and cloud communications markets more generally
- There being continuing demand and subscriber growth for our Services and continuing demand as anticipated for our Products
- The impact of changes in global exchange rates on the demand for the Company’s Products and Services
- The ability of the Company’s customers to continue their business operations without any material impact on their requirements for the Company’s Products and Services
- The Company’s forecasted revenue from its internal sales teams and via channel partners will meet current expectations, which is based on certain management assumptions, including continuing demand for the Company’s products and services, no material delays in receipt of products from its contract manufacturers, no further material increase to the Company’s manufacturing, labor or shipping costs
- There are no additional revenue reclassifications
- The Company is able to remediate the material weaknesses identified in its internal control over financial reporting
- That the Company is able to attract and keep the employees needed to maintain the current momentum
- The continued ability for the Company’s operational employees to work at the Company’s internal and outsourced facilities
- Other employees being able to work from home as required without any material impact on productivity

**CONTROLS AND PROCEDURES**

Management of the Company, under the supervision of the Chief Executive Officer and Chief Financial Officer, is responsible for establishing and maintaining adequate internal control over
financial reporting (“ICFR”) (as defined under applicable Canadian securities laws and by the United States Securities and Exchange Commission (“SEC”) in Rule 13a-15(e) under the Securities Exchange Act of 1934, as amended (the “Exchange Act”) for the company to ensure that (i) material information relating to the Company is made known to management by others, particularly during the period in which the annual and interim filings are being prepared; and (ii) information required to be disclosed by the Company in its annual and interim filings or other reports filed or submitted under securities legislation is recorded, processed, summarized and reported within the time period specified in securities legislation.

Management, under the supervision and with the participation of our Chief Executive Officer and Chief Financial Officer and oversight of the Board of Directors evaluated the effectiveness of our ICFR as of December 31, 2022 against the criteria set forth in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based upon the evaluation, management has concluded that, because of the material weakness described in our management discussion & analysis for the year ended June 30, 2022 (the “Fiscal 2022 Annual MD&A”), as of such date, the Company’s disclosure controls and procedures were not effective.

Remediation of Material Weakness in ICFR

As previously described in our Fiscal 2022 Annual MD&A, management has initiated remediation efforts to address the material weakness identified in its Fiscal 2022 Annual MD&A, as well as to foster improvement in the Company’s internal control and enhance the overall financial control environment.

While we believe that the efforts taken to date and those planned for remediation will improve the effectiveness of our internal control over financial reporting, the material weakness will not be considered remediated until the applicable controls operate for a sufficient period of time and management has concluded, through testing, that these controls are operating effectively.
GLOSSARY OF TERMS

Analog
Analog telephony is the telephone system that dates back to the original experiments by Alexander Graham Bell. The voice signal is picked up by a microphone and transmitted to the central office. Voice signals from the central office consist of voltages that drive a headset to produce sound. Analog means that the voice pressure signals are represented by voltages levels on the line.

API
Application Program Interface: An API is a purpose-built interface that allows fourth party software to interact with a particular application. A typical API is the user interface for Windows that allows programmers to write programs for Windows that use all its built-in utilities. APIs do not depend on revealing source code, in general. They are usually well documented and include sample programs that make development easy.

Codecs
In the telephony context a codec is a mechanism of digitally encoding voice. On the PSTN a voice channel takes up 64kbps in a codec standard called G.711. Cell phones use a codec called GSM that compresses the voice further so that a GSM call consumes about 24kbps. Other compressed codecs are used in VoIP to conserve bandwidth. These include standards such as G.729, G.723. Most audio codecs are lossy, in that some of the voice quality is degraded by the compression. On the other hand, as bandwidth becomes cheaper, VoIP allows one to use other codecs that in fact use more bandwidth than the PSTN, the so-called broadband codecs that have DVD-like voice quality.

Digital telephony
In the modern PSTN only the “last mile” line to the customer is still analog, all other internal parts of the network are digital. Digital in this case means that at the central office the analog signal from the subscriber’s telephone is sampled digitally, converting the line voltages to a series of numbers that can be easily transmitted error free over long distances. See T1, E1 below.

DID
Direct Inward Dialing (“DID”) is a virtual phone number that uses the existing phone lines to route incoming calls. Callers can connect to a phone extension directly without an operator. This offers convenience for both employees and callers alike. DID offers a cost saving on its own and is less expensive when purchased with a SIP trunk.

Gateway
In the telephony context this is typically a separate unit with its own case and power supply that provides VoIP-to-PSTN services for a VoIP network. Almost all gateway devices use SIP interfaces to the VoIP system over Ethernet and have analog or digital telephony interfaces that connect to the PSTN. VoIP gateways are available from many manufacturers including Audiocodes, Cisco, Grandstream, Patton Electronics and many others.

ISDN
Integrated Services Digital Network (“ISDN”) is a set of communications standards for simultaneous digital transmission of voice, video, data, and other network services over the traditional circuits of the public switched telephone network. Of the many variations of ISDN, Sangoma supports BRI (Basic Rate Interface) which is essentially an all-digital replacement for ordinary analog lines and PRI (Primary Rate Interface) which is used over T1 and E1 lines. BRI is very popular outside of North America. PRI is used worldwide.

IoT
Internet of Things (“IoT”) refers to a system of interrelated, internet-connected objects that are able to collect and transfer data over a wireless network without human intervention.

IP
The Internet Protocol (“IP”) is the primary protocol in the internet layer of the Internet protocol suite, and delivers data packets from the source host to the destination host solely based on the IP address.

ISP
Internet Service Provider

ITSP
Internet Telephony Service Provider who offer telecommunications service including voice over internet type connections.
IVR
Interactive Voice Response: IVR systems use the phone to navigate a menu, for example those used by banks to allow access to customer’s account information. IVR systems have typically been driven by dial tones as the buttons on your phone are pressed, but increasingly they are using voice recognition for navigation.

Open Source
Open Source software is distributed free subject to certain conditions. Open Source licenses usually stipulate that source code must always be distributed or made available, and any improvements in the code have to be donated back to the community. It is possible to have dual licensing: Open Source to the community and also a closed, commercial license of the same or similar software.

NetBorder
This is the trade name of a Sangoma SIP to PSTN gateway product. It includes several other functions in addition to the PSTN gateway function. The mass marketed version is known as NetBorder Express or NBE.

PBX
Private branch exchange. A PBX is a premised basis device to deliver calls from the PSTN or VOIP network to phones in a single or multiple locations.

PSTN
Public Switched Telephone Network: This is the standard telephone network that has been in operation for many decades. A telephone or FAX or PBX or other telephony device is generally connected to an analog line at a wall plug, which is connected by “last mile” cabling to the central office. The analog signal from the device is converted to a digital signal at the Telco central office and is multiplexed, 24 simultaneous voice channels per line (in North America) onto a T1 for onward transmission. At the other end of the line the digital channel is reconverted to analog for transmission over the “last mile” to the receiving phone or other device.

SBC
A Session Border Controller (“SBC”) is a device deployed in Voice over Internet Protocol (“VoIP”) networks to exert control over the signaling and usually also the media streams involved in setting up, conducting, and tearing down telephone calls or other interactive media communications. SBCs are deployed as demarcation points between enterprises and service providers and between service provider networks.

SD-WAN
A Software-defined Wide Area Network (“SD-WAN”) uses software to control and manage connectivity across a customers wide area network. While traditional wide area networks rely on physical routers to connect remote users, this centralized software solution can help customers monitor their performance of the network and manage traffic.

Signalling
Call setup and tear down is remarkably complicated, involving such things as responding to the different tones as well as generating them, caller identification and handling the different features like hook-flash and voicemail properly. There are different signalling mechanisms for different types of circuits. Analog circuits use tones such as out-of-order, busy, ringing as well as the dialling tones. T1 lines often use a data protocol called ISDN PRI, where packets of control data are exchanged on a separate data channel. ISDN PRI is a simplification of the general signalling protocol used internally by the telecommunications networks known as SS7. In all cases signalling has to be exactly compatible with what the Telco expects, so interoperability and standards are important.

SIP
Session Initiation Protocol: SIP is the emerging standard signalling protocol for VoIP, though it has much broader applications. SIP is responsible for setting up and tear down of two party and multiparty calls, as well as a host of management features. To a great and increasing extent, VoIP calls are SIP based. The term SIP Trunk is used to describe the provision of a SIP line to an end customer.

T1, E1
A T1 line is a circuit that carries 24 digital telephone calls simultaneously. At higher densities, 28 T1s are aggregated into a T3 line carrying 672 calls. Larger offices can also connect to the central office via T1 directly, so as to have only one circuit for up to 24 calls. T1 is standard in North America and Japan while E1 is the standard in the rest of the world. E1 carries 30 channels of digitized voice per line.

TDM
Time Division Multiplexing (“TDM") is used in circuit switched networks to increase the number of calls carried simultaneously on any one circuit and formed the basis for the digital telephony networks.
**Unified Communications**
Unified communications is a concept in which voice, email, messaging, video and any other type of communication are all considered forms of data that can be combined, manipulated and used in intelligent applications in a seamless way.

**VoIP**
Voice over IP: The transfer of voice traffic over the Internet Protocol. IP is used universally for all networking including local area networks and private networks, not just the Internet. VoIP is not necessarily voice over the Internet, but voice over general data networks.