PAYMENTS CANADA

LVTS DISCLOSURE

BANK OF CANADA RISK-MANAGEMENT STANDARDS

JUNE 30, 2019

payments.ca

Responding FMI:	Payments Canada
Date of this disclosure:	June 30, 2019
Jurisdiction in which the FMI operates:	Canada
Regulating, supervising, or overseeing Authority:	Bank of Canada Minister of Finance

This disclosure can also be found at **www.payments.ca**
For further information, please email **info@payments.ca**

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EXECUTIVE SUMMARY

The Canadian Payments Association (CPA) was created by the Canadian Payments Association Act in 1980. The Canadian Payments Association operates under the brand name of Payments Canada.

Payments Canada is Canada's main financial market infrastructure for payments. We underpin the Canadian financial system and economy by providing safe, efficient and effective clearing and settlement of payments.

This document is intended to provide relevant disclosure to members and stakeholders on Payments Canada's governance, operations and risk-management framework.

On April 2012, the Bank for International Settlements' Committee on Payments and Market Infrastructures (CPMI) and the Technical Committee of the International Organization of Securities Commissions (IOSCO) published the Principles for Financial Market Infrastructures (PFMIs) to establish a uniform set of international risk-management standards applicable to all systemically important financial market infrastructures (FMIs).

The Bank of Canada adopted the PFMIs as part of its risk-management standards (the standards) for designated FMIs. The standards apply to the management and operation of the Large Value Transfer System (LVTS), which is owned and operated by Payments Canada. The LVTS was designated by the Bank of Canada as systemically important under the *Payment Clearing and Settlement Act* (PCS Act). This disclosure describes the Payments Canada's operations and its approach to observing the applicable standards.

CPMI and IOSCO published in December 2012 Principles for Financial Market Infrastructures: Disclosure Framework and Assessment Methodology to assist FMIs in their application of the PFMIs and to facilitate consistent disclosure of information by FMIs. Payments Canada's disclosure follows the framework set forth in that report and additional guidance provided by the Bank of Canada.

Summary of major changes since last disclosure update

The version of Payments Canada's disclosure is dated June 30, 2019. Notable changes since the previous disclosure:

- As of February 2017, Payments Canada finalized a comprehensive plan to facilitate the financial recovery of its operations;
- Payments Canada has met its obligations to fully observe all the relevant standards.

Additional updates will be provided and published following significant changes to the system or its environment.

General background of Payments Canada

Payments Canada owns and operates the core national payments infrastructure that allow its members to clear and settle payments each day. Along with operating the systems, Payments Canada develops, implements and updates the rules and standards that govern the clearing and settlement of payments between its members.

Payments Canada's mandate is to:

- Establish and operate national systems for the clearing and settlement of payments and other arrangements for the making or exchange of payments;
- Facilitate the interaction of Payments Canada's systems and related arrangements with others involved in the exchange, clearing and settlement of payments; and
- Facilitate the development of new payment methods and technologies.

In pursuing its mandate, Payments Canada promotes the efficiency, safety and soundness of its clearing and settlement systems and considers the interests of users. In order to achieve this, dialogue, consultation, research, policy development and outreach are imperative to Payments Canada's stewardship of the payments ecosystem in Canada.

Payments Canada operates two primary clearing and settlement systems: the Automated Clearing Settlement System (ACSS) and the LVTS. In addition, the US Dollar Bulk Exchange (USBE) system is used for clearing payments in U.S. dollars. Settlement of USBE balances is done through banks in New York.

Payments Canada members

The Bank of Canada and all chartered banks operating in Canada are required to be members of Payments Canada. Trust and loan companies, credit union centrals, federations of caisses populaires and other deposit-taking institutions, life insurance companies, as well as securities dealers and money market mutual funds that meet certain requirements are also eligible to be members. As of June 2019, Payments Canada had 114 active members. Payments Canada's Member Advisory Council (MAC), which was created by the *Canadian Payments Act* (CP Act), is composed of a maximum of 20 members appointed by the board of directors. MAC serves as a consultative and engagement forum for the Payments Canada membership. It is broadly representative of the diversity of Payments Canada's membership and its mandate is to provide the board with advice on Payments Canada's clearing and settlement systems, the interaction of those systems with others involved in the exchange, clearing and settlement of payments, and the development of new technologies.

Payments Canada stakeholders

Payments Canada develops and implements rules, standards and procedures that apply to payments exchanged by Payments Canada members who use these systems for clearing and settlement. Although the rules are developed for payments exchanged by members, they do affect the way consumers, government and businesses make payments.

Other payment systems fall partially within the scope of Payments Canada domain. In the case of Interac and some third-party payment processors, these schemes operate separately, but rely on Payments Canada's systems for clearing and settlement. Many private offerings or schemes (e.g. credit cards and e-wallets), choose to rely on Payments Canada's LVTS to effect settlement.

The Payments Canada's Stakeholder Advisory Council (SAC), which was established by the CP Act, has a maximum of 20 members representing the views of Payments Canada broad stakeholder base, including consumers, businesses, retailers, and governments, as well as related service providers. SAC provides advice and counsel to the Payments Canada Board of Directors. It assists the decision-making process by identifying issues of concern to payment system users and providers, suggesting how they might be addressed, and participates in a number of Payments Canada's working groups and committees.

Payments Canada legal and regulatory framework

The CP Act sets out the legal framework for Payments Canada, including its mandate, the types of organizations eligible for membership, the role of the board of directors and oversight responsibilities of the minister of finance.

The Minister of Finance has oversight powers respecting Payments Canada and payment systems under the CP Act. These include approval and directive powers regarding bylaws, rules and standards set out by Payments Canada, or any other payment system designated for such oversight under the CP Act.

The PCS Act assigns the Bank of Canada responsibility for overseeing clearing and settlement systems for the purpose of controlling systemic risk or payments system risk. Payments Canada's LVTS has been designated as systemically important under this Act, so Payments Canada is also subject to oversight from the governor of the Bank of Canada for the LVTS.

Systems design and operations

Clearing is the process through which Payments Canada members exchange and reconcile payment items made by clients and the calculation of net balances due to or from members prior to settlement.

Settlement is the process through which Payments Canada members fulfill their net clearing obligations to other members by transferring funds between accounts held at the Bank of Canada based on the amounts owed to each other as calculated in the clearing process.

The LVTS is owned and operated by Payments Canada and has been in existence since February 1999. The LVTS is an electronic wire system that facilitates the transfer of irrevocable payments in Canadian dollars across the country. Through LVTS, funds can be transferred between participating financial institutions virtually instantaneously in a fully collateralized environment. The LVTS also facilitates settlement for Canada's other financial market infrastructures and payment systems. Virtually all interbank Canadian dollar financial market transactions are ultimately settled via LVTS payments.

LVTS key metrics	2016	2017	2018
Daily average value settled	$ 175 billion	$173 billion	$181 billion
Daily average volume settled	34 thousand	35.9 thousand	37.8 thousand
Daily median collateral pledged	$ 38 billion	$ 37 billion	$ 38 billion

On average (2018 data), the LVTS was used to clear and settle about $181 billion in Canadian dollar payments each business day; approximately 37,000 payments were processed each day.

The system is risk-proofed such that it provides participating Payments Canada members with certainty of settlement and finality of payment. Each transaction is validated in real time, or at the time the transaction is initiated, based on the credit limits and positions of the participants. If the payment passes the risk control tests, notification of acceptance is sent to the sending participant and the payment message is released for delivery to the receiving participant.

LVTS provides each participating institution with two options (Tranche 1 or Tranche 2) for exchanging payments with other participants. Both payment options provide real-time finality to the recipient and certainty of settlement to the financial institution. The difference lies solely in the method by which they are supported by collateral.

For Tranche 1 transactions, the net exposure is entirely backed by collateral pledged by the sending participant. If the participant should default on its settlement obligation, this collateral will be used to cover any net negative position in this category. This corresponds to a defaulter pay model.

A transaction in Tranche 2 is backed by collateral pledged by the receiver of the payment Tranche 2 provides for a defaulter and survivor pay model. The collateral is provided by each participant (at the beginning of each LVTS cycle), which has granted a bilateral limit to each other participant. The amount of collateral that must be apportioned for Tranche 2 represents the maximum amount a participant who has granted bilateral credit limits could be called upon to contribute in the event of a default of another participant. In the event of a default, any collateral which has been pledged by the defaulter to the Bank of Canada during the LVTS cycle is used and, if a shortfall remains, the surviving institutions which have granted the defaulter a bilateral credit limit will be called upon to contribute to make up the shortfall.

The risk-proofing ensures that settlement can be accomplished even if the participant with the largest net debit position fails to provide funds for settlement. In addition, the Bank of Canada has provided an express guarantee to ensure settlement even in the unlikely event of the simultaneous default of more than one participant.

Certainty of settlement is achieved through CPA By-law No. 7 - respecting the LVTS (LVTS bylaw), rules and procedures and the Bank of Canada guarantee, which ensures that there will be enough collateral available to permit settlement on the books of the Bank of Canada at any time if any financial institution participating in the system defaults in meeting its settlement obligation.

The system is designed to provide for one settlement only per cycle, by means of one debit or credit entry to the Bank of Canada settlement account of each LVTS participant. The settlement for each participant is on a multilateral net position basis. Settlement for the system must occur before the beginning of the next LVTS cycle.

Payments Canada Modernization

Payments Canada is leading a complex, industry-wide initiative to modernize core clearing and settlement systems to better meet the needs of the payments ecosystem which includes the replacement of LVTS by Lynx.

The Modernization Target State document provides a detailed view of Canada's Modernization program, including descriptions of core systems and their fundamental support structures such as risk and regulatory requirements, access and settlement models, and technology platforms.[1]

Lynx, Canada's new high-value payment system, will provide for a real-time gross settlement system with a cover-all defaulter pay credit risk model. Lynx will be designed to comply with the Bank of Canada's standards in the most efficient and effective way.

Given the nature of this change and the related commitment and investment required by payments system participants, significant industry engagement, detailed planning, and robust risk management are an integral part of the Modernization program.

Standards narrative disclosure

Standard 1: Legal basis

An FMI should have a well-founded, clear, transparent and enforceable legal basis for each material aspect of its activities in all relevant jurisdictions.

Payments Canada owns and operates the LVTS as set out in the CP Act.

The legal framework for the LVTS is built on a strong statutory foundation, including: the CP Act, under which the CPA is incorporated; the PCS Act, which outlines the oversight of LVTS as a systemically important payment system by the Bank of Canada; LVTS bylaw; and LVTS rules that support the operation of LVTS, which are created under the authority conferred by the CP Act.

The PCS Act also provides unassailable protection of the LVTS real-time, multilateral netting structure.

The LVTS bylaw is a regulation under the federal *Statutory Instruments Act* and subject to the requirements and scrutiny of that legislation. Payments Canada bylaws that relate to

[1] The **Modernization Target State** document is the third publication in a series documenting Canada's payments Modernization journey. The **Vision for the Canadian Payments Ecosystem** identified the needs in the Canadian marketplace – such as faster, safer and data rich payments - and the **Roadmap & High-Level Plan** outlined what the industry needed to do to begin to deliver on those needs.

the administration of Payments Canada may be approved by the board. All other bylaws (and bylaw amendments) must be approved by the minister of finance.

Amendments to the rules are approved by the board, which includes seven independent directors, and are also subject to the rule disapproval process of the minister of finance. As such, the activities of Payments Canada in the operation of the LVTS flow from statutory authority, which provides a high level of certainty, transparency and enforceability.

Working together, Payments Canada and its members have put in place common rules and procedures to maintain and enhance an effective payments system. Working groups, committees and other such forums are engaged in the evolution of the LVTS and its rules. All LVTS rules and amendments are reviewed by the Bank of Canada, approved by the board and are subject to the rule disapproval process of the minister.

Standard 2: Governance

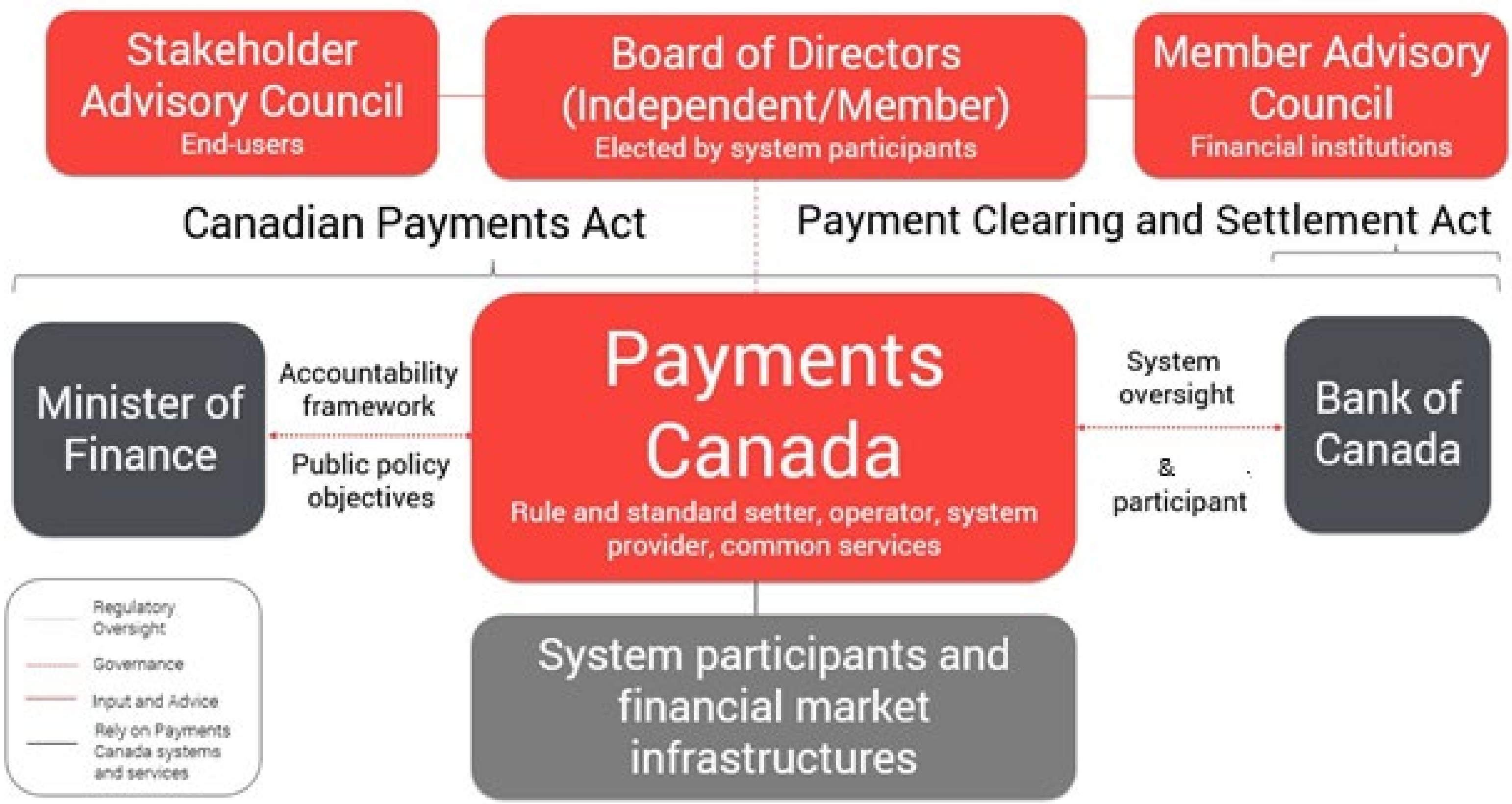
An FMI should have governance arrangements that are clear and transparent, promote the safety and efficiency of the FMI and support the stability of the broader financial system, other relevant public interest considerations and the objectives of relevant stakeholders

The governance arrangements that apply to the LVTS are those that apply more broadly to Payments Canada as an organization. These arrangements are prescribed and outlined in the CP Act, regulations made under the act and Payments Canada bylaws and rules.

These instruments are publicly available and provide a high level of clarity and transparency around Payments Canada's objectives, lines of responsibility within the board and management, accountability and oversight; and the interaction with stakeholders and the public. The CP Act also specifically invests Payments Canada with the responsibility to "promote the efficiency, safety and soundness of its clearing and settlement systems and take into account the interests of users" in pursuing all objects of the association. In addition, the PCS Act, which applies to the LVTS, contemplates that the supervision and regulation of clearing and settlement systems (as an essential element of the financial system in Canada) is predicated on the need to control risk and promote the efficiency and stability of the financial system in Canada.

The Payments Canada Board of Directors consists of an independent chair, the president and CEO, seven independent directors (including the chair) and five member directors. Domestic systemically important banks are represented by at least two and a maximum of three directors.

The Minister of Finance has the authority to review new Payments Canada rules or amendments to existing rules and, if appropriate, disallow the whole or part of a rule. The minister also has the power to issue a directive including a directive to make, amend or repeal a bylaw, rule or standard.



The PCS Act assigns the Bank of Canada responsibility for overseeing clearing and settlement systems for the purpose of controlling systemic risk or payments system risk. Payments Canada's LVTS has been designated as systemically important under this act, so Payments Canada is also subject to oversight from the governor of the Bank of Canada for the LVTS.

Payments Canada employs industry best practices in governance through various policies to increase efficient and effective decision making within its legislative framework. Roles and responsibilities around risk management and reporting of risk are clearly defined in Payments Canada's enterprise risk management (ERM) policy.

Payments Canada also employs strong practices that ensure accountability to its users and the public, through its engagement with SAC and MAC, its member and stakeholder surveys in addition to its communications strategy.

Risk management governance starts with the Payments Canada Board of Directors. Also contributing to the work of Payments Canada is the SAC and the MAC, which provide advice and expertise to the board on payment, clearing and settlement issues.

The board of directors has standing committees to assist it in fulfilling its responsibilities. The Risk Committee oversees the performance of risk management at Payments Canada and makes recommendations to the board. The executive leadership team's (ELT) responsibilities for oversight of risk management are met through an internal risk committee (IRC). The committee is comprised of all members of the ELT and the chief information security officer.

Standard 3: Framework for the comprehensive management of risks

An FMI should have a sound risk-management framework for comprehensively managing legal, credit, liquidity, operational and other risks.

Risk is the uncertainty that surrounds future events and outcomes. As such, it is inherent in all we do and, therefore, risk management is critical to Payments Canada fulfilling its core purpose, vision and strategic plan.

Payments Canada has a formal risk management process that is overseen by the board, implemented by management and executed by all in Payments Canada. The board-approved ERM policy sets out the roles and responsibilities for risk management and governance.

Payments Canada follows a three lines of defense approach, which distinguishes among three groups or lines required to support effective risk management. The first line of defense is the business units that perform day-to-day risk management – the functions that own and manage risks of relevance to their area of responsibility. The second line performs designs risk management frameworks and oversees the implementation of these frameworks. The third line provides independent assurance and includes internal and external audit and other independent assurance providers.

The ERM program is based on the ISO 31000 standard and is heavily influenced by industry best practices

The objective of Payments Canada's ERM program is to support decision-making in achieving Payments Canada's core purpose, vision and strategic plan by managing all key risks across the organization in a comprehensive and integrated way. In doing this:

- All staff have a framework to confidently identify and manage risks in their day-to-day activities;
- ELT can confidently and effectively identify, understand and manage risk across Payments Canada and is able to provide assurance of this to the board; and
- The board can confidently provide oversight of risk management.

This ERM policy sets the overall intent and expectations for risk management in Payments Canada in accordance with a risk appetite approved by the board and set out in the risk appetite policy. A complementary ERM framework describes how Payments Canada addresses ERM policy requirements in alignment with the risk appetite.

With respect to the LVTS, risk management is implicit in the system; payments must pass risk controls before they are approved. Additionally, to manage risk, the LVTS bylaw and LVTS rules impose requirements on participants, provide default rules and procedures and establish an LVTS emergency committee to manage operational events.

In terms of the organization itself, Payments Canada continues to mature its risk management practices as set out in the ERM policy, approved by the board in late 2018 and reviewed annually.

The following principles anchor Payments Canada's ERM:

- Risk management is enterprise-wide and done in an integrated way.
- Risk management supports decision-making.
- Risk management is dynamic.
- Risk management requires accountability and transparency.
- A culture that promotes good risk management is imperative to success.

In managing risk in accordance with its risk appetite, Payments Canada develops strategies to mitigate risk (likelihood and impact) and maximizes the positive effects of strategic opportunities. The board, president and CEO, chief risk officer, the executive leadership team (ELT), and Payments Canada personnel and committees all play a role in this process.

Payments Canada has several mechanisms for assessing and reporting on its risks throughout the year, including but not limited to: the risk profile is reviewed quarterly by the IRC and risk committee of the board; an operational report, which includes an overview of the LVTS, is provided to the Bank of Canada quarterly and risk controls are assessed by an external auditor bi-annually.

Standard 4: Credit risk

An FMI should effectively measure, monitor and manage its credit exposures to participants and those arising from its payment, clearing and settlement processes. An FMI should maintain sufficient financial resources to cover its credit exposure to each participant fully with a high degree of confidence. In addition, a CCP that is involved in activities with a more complex risk profile or that is systemically important in multiple jurisdictions should maintain additional financial resources sufficient to cover a wide *range of potential stress scenarios that should include, but not be limited to, the default of the two participants and their affiliates that would potentially cause the largest aggregate credit exposure to the CCP in extreme but plausible market conditions. All other CCPs should maintain additional financial resources sufficient to cover a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would potentially cause the largest aggregate credit exposure to the CCP in extreme but plausible market conditions.*

The framework, set out in the LVTS bylaw, that facilitates the structure of the LVTS within Payments Canada provides for a shared and integrated responsibility for monitoring and managing credit risk. Payment messages must pass real-time risk control tests before being accepted by the system. Payments that pass the required risk control tests are netted multilaterally in real-time on a payment-by-payment basis and are final and irrevocable immediately.

As set out in the LVTS bylaw, the management of credit risk is primarily facilitated through the collective pledging of collateral (Tranche 1 or Tranche 2) by all participants to the Bank of Canada.

Tranche 1 is backed by collateral pledged by the sending participant. If the participant should default on its settlement obligation, this collateral will be used to cover any net negative position in this category.

Tranche 2 is backed by collateral pledged by the receiver of the payment. The collateral for Tranche 2 is provided by each participant (initially established at the beginning of each LVTS cycle) based on the bilateral limit granted to each other participant. A bilateral limit is the maximum bilateral net debit position that a participant is willing to accept from another participant at any time during an LVTS cycle. The amount of collateral that must be apportioned for Tranche 2 represents the maximum amount a participant who has granted a bilateral limit could be called upon to contribute in the event of a default of one or more participants. Therefore, participants manage their credit exposure by pledging collateral and subsequently managing their bilateral credit limits granted other participants in the system. Positions, per participant or as an overall system, can be monitored in real time by Payments Canada and the Bank of Canada.

The LVTS bylaw and rules clearly set out the method of calculating the additional settlement obligations of all parties and, in the unlikely event that these funds were insufficient due to multiple defaults on the same day, any obligation of the Bank of Canada.

The responsibilities of a participant in the case of a default of another participant are directly related to the level of credit a participant grants in the LVTS to that other participant. There is an overall multilateral net debit cap placed on each participant in the system. Participants can decide whether they wish to grant intraday credit to other participants or not. If they do grant bilateral limits, collateral must be pledged to the Bank of Canada in an amount equal to its maximum additional settlement obligation, which is equal to a percentage that is currently equal to 30 per cent, multiplied by the largest bilateral limit that a participant has granted to any other participant. As such, they have an incentive to manage this exposure carefully. In order to respond to market pressures and fluctuations, there is a formal mechanism in place to change the system wide percentage.

The LVTS rules state that participants are expected to manage their multilateral net position in such a way that payments should be approved at the first pass through the risk control tests. A payment that fails the appropriate risk control tests and meets the minimum threshold amount for a jumbo payment is placed in the queue[2] awaiting sufficient collateral or net position to build up before processing the payment.

The jumbo algorithm attempts to match and offset queued payments every 15 minutes during general payment exchange. The first running of the algorithm is at 01:00 hours E.T. and the final running of the algorithm occurs at 18:00 hours E.T. at the beginning of the pre- settlement period. All queued payments passed by the algorithm are processed normally by the system and participants' net bilateral and multilateral positions are adjusted accordingly in real time. Payments held in the queue are also retried automatically every time additional credit becomes available to the sender.

The risk controls are designed such that there are sufficient resources to cover the default of one participant with the largest exposure to the cycle. The Bank of Canada covers any shortfall if more than one participant defaults, guaranteeing settlement.

Standard 5: Collateral

An FMI that requires collateral to manage its or its participants' credit exposure should accept collateral with low credit, liquidity and market risks. An FMI should also set and enforce appropriately conservative haircuts and concentration limits.

The collateralization requirements of the system are such that participants are required to individually pledge to the Bank of Canada appropriate securities that together have a value sufficient to cover an inability to settle by the participant with the largest single settlement obligation.

The Bank of Canada determines the list of securities that are eligible to be pledged as collateral for LVTS operations. The list of eligible collateral consists primarily of securities that are issued or guaranteed by the Government of Canada or a provincial government. The list of eligible securities also includes other securities that meet minimum credit rating

[2] A payment will enter queue if it does not pass the applicable risk control tests and the payment is above a minimum threshold value of $100 million (jumbo payment).

requirements as determined by the Bank of Canada. The Bank of Canada accepts high-quality securities as collateral to secure intraday credit in the LVTS and overnight advances from its Standing Liquidity Facility, provided the Bank of Canada receives a first-priority security interest. The Bank of Canada periodically reviews its collateral policy and can make changes in response to market developments, new financial instruments or financial conditions.

LVTS participants are required to sign the appropriate legal documentation in the Bank of Canada's form, granting security in the assets pledged as collateral. The Bank of Canada may choose to register its security in the personal property security registries of the appropriate jurisdictions. The Bank of Canada also needs to be assured that its security is registered in the personal property registry of the participant's home jurisdiction, thereby giving the Bank of Canada a first priority security interest.

The Bank of Canada periodically reviews the adequacy of its collateral policy and can make changes in response to market developments, new financial instruments or financial conditions.

The Bank of Canada provides a collateral management system, the High-Availability Banking System (HABS), which combined with other related systems and process controls, ensure that only eligible collateral is accepted. Many of the eligible securities under the policy are pre-approved by the Bank of Canada, including the appropriate pricing. Any securities that are not pre-approved are reviewed on a security-by-security basis against the eligibility criteria before they can be pledged to the Bank of Canada.

Collateral is valued each morning prior to the payments cycle beginning and also when additional securities are pledged by a participant throughout the payments cycle. The Bank of Canada retains the right to revalue collateral on an intraday basis. Collateral is valued by the Bank of Canada at market value less a discount (haircut), which depends on the type of asset, its maturity and credit rating. The Bank of Canada imposes prudent haircuts to account for volatility of market pricing. Principally, haircuts are determined on a through-the-cycle approach, using a sample of historical data that account for periods of high volatility.

Standard 7: Liquidity risk

An FMI should effectively measure, monitor and manage its liquidity risk. An FMI should maintain sufficient liquid resources in all relevant currencies to effect same-day and, where appropriate, intraday and multiday settlement of payment obligations with a high degree of confidence under a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would generate the largest aggregate liquidity obligation for the FMI in extreme but plausible market conditions.

Payments Canada itself does not act as a liquidity provider or bear liquidity risk. Instead, the structure of the LVTS (supported by the LVTS bylaw and rules), including its risk controls, collateral requirements and calculation of additional settlement obligations (ASO), ensures that liquidity risks are borne and managed by the participants (including the Bank of Canada as the lender of last resort). Throughput guidelines encourage participants to process certain percentages of their daily payment volume and values prior to specific times during the day which assists in managing liquidity risk.

The LVTS provides participants, the Bank of Canada and Payments Canada with the ability to monitor their positions in real time. Payments Canada engages in periodic testing of the default and ASO call functionality. Net debit caps and bilateral credit limits are in place to restrict exposure for any participant. LVTS rules require that participants manage their position and limits in real-time and should only release payments that will pass the risk control tests. LVTS operates with a queue algorithm[3] to provide more efficient liquidity management and allow payments that may otherwise not pass applicable risk control tests to be offset. Participants know at all times what the amount of their minimum collateral required for the system and they have the ability to pledge additional collateral and have it valued in real-time.

Payments Canada has the ability to generate a report that provides the volume and value of all payments sent by each participant in 30-minute intervals throughout the day. At the participant level, intraday liquidity risk is governed by risk management frameworks identified in applicable participant policies and standards that employ layered internal risk controls and audits. Participant policies and standards specify the process for setting appropriate risk limits and monitoring, as well as requirements for escalation of exceptions to risk limits. The limited number of LVTS participants means that counterparties are well known to each other.

Liquidity managers are in daily contact with each other in an effort to optimize the available liquidity between the two tranches, are familiar with normal flows and are able to quickly respond to unusual situations. There is a balance between the bilateral limits and the amount of liquidity required for the system to function efficiently – this balance is both familiar and acceptable to participants as to the risk. Intraday liquidity risk is typically measured by participants through periodic reconciliation of mid-day liquidity demands against forecasts and end-of-day settlement positions (which are evaluated on an historic and on a scenario basis).

Tools used by participants are a combination of manual and automated monitoring and reporting. Internal systems communicate funding requirements and track and forecast funding demands. Net funding positions are monitored in real-time using the LVTS. LVTS balances are also monitored in real-time to ensure adequate collateralization of the system. Participant liquidity managers are prompted by internal monitoring systems should a particular outbound payment be up against the allowable limit at that point in time.

[3] See footnote 2

Throughput guidelines encourage participants to process a certain percentage of their daily payment message volume and value before specific times each day. Daily monitoring on throughput guidelines is reported on a quarterly basis.

Standard 8: Settlement finality

An FMI should provide clear and certain final settlement, at a minimum by the end of the value date. Where necessary or preferable, an FMI should provide final settlement intraday or in real time.

The LVTS is a multilateral netting by novation system that has risk controls, which allow it to provide equivalent settlement finality to a Real Time Gross Settlement (RTGS) system. There are two separate principles of finality: payment finality is on receipt by the receiving participant and settlement finality (end of LVTS cycle) is on the books of the Bank of Canada.

Novation takes place when (a) the obligation of the debtor participant to pay the amount of the payment to the creditor participant; and (b) the right of the creditor participant to receive the amount of the payment from the debtor participant are extinguished and replaced by (a) an obligation of the debtor participant to pay the amount of the payment to all participants jointly; and (b) a joint obligation of all participants to pay the amount of the payment to the creditor participant.

The rights of a participant to receive payments due to it from all participants jointly are netted and set off against the obligations of that participant to pay all payments due by it to all participants jointly. The netting processes occur simultaneously and each is deemed to be automatic and continuous without any action by any person and constitutes a complete and final discharge and payment of the obligations of each participant to the extent that they are netted. Each payment is final and settlement is assured immediately, even though the actual settlement occurs at the end of the day on a multilateral net basis by means of one debit or credit entry on the Bank of Canada settlement account of each LVTS participant.

Multilateral netting by novation and payment/settlement finality is supported by the federal PCS Act, the LVTS bylaw and rules made pursuant to the CP Act and the right of set off in common law, which is recognized in insolvency legislation in Canada. The certainty of settlement is reinforced through the guarantee of settlement, which is given by the Bank of Canada.

LVTS payments are not batch processed. Payments are individual and netting is done each time an individual payment is made. Once a payment is approved, the payment may not be revoked and no adjustment, reversal or unwinding of any approved message may be made under any circumstances.

Standard 9: Money settlements

An FMI should conduct its money settlements in central bank money where practical and available. If central bank money is not used, an FMI should minimize and strictly control the credit and liquidity risk arising from the use of commercial bank money.

The LVTS uses claims on the central bank money for settlement of Canadian dollar obligations. Each LVTS participant is required to maintain an account on the books of the Bank of Canada specifically for the purpose of settling its LVTS position.

Standard 13: Participant default rules and procedures

An FMI should have effective and clearly defined rules and procedures to manage a participant default. These rules and procedures should be designed to ensure the FMI can take timely action to contain losses and liquidity pressures and continue to meet its obligations.

The legal framework for LVTS participant default is set out in the LVTS bylaw and rules.

The LVTS bylaw defines the circumstances of a participant default and contains the impact of the default by minimizing the exposure to risk through the use of net debit caps, bilateral credit limits and ultimately the guarantee of settlement by the Bank of Canada.

As part of the certification process for any new participant, Payments Canada reviews the default framework and conducts testing with participants to ensure all participants are familiar with loss allocation procedures and the funding of any additional settlement obligations.

Procedures for default are set out in the LVTS bylaw and the Bank of Canada ultimately provides the final guarantee of settlement, which creates a debt of the defaulting participant to the Bank of Canada and remaining participants.

A participant is in default for the purposes of the LVTS if, immediately on demand by the Bank of Canada or within any time period that may be specified by the Bank of Canada, it fails to obtain a discretionary advance from the Bank of Canada to enable it to settle its negative multilateral net position. LVTS Rule 13 outlines the procedures for notification with respect to implementing the default of a participant.

Testing of the default functionality in LVTS is conducted annually with participants. Results of the exercise, including gaps and lessons learned, are shared with LVTS participants, Payments Canada management, and the Bank of Canada. Payments Canada continues to evolve the scope and complexity of these tests; an integrated exercise with Canadian Depository for Securities (CDS) and Canadian Derivatives Clearing Corporation (CDCC) was performed in 2017.

In 2010, amendments were made to the *Canada Deposit Insurance Corporation Act* (CDIC Act) to provide the Canada Deposit Insurance Corporation (CDIC) with greater flexibility to enhance its ability to safeguard financial stability in Canada. As part of amendments that came into effect in 2010, CDIC was given the power to establish a bridge institution.[4] The CP Act was amended to accommodate the bridge institution concept within Payments Canada's clearing and settlement framework. In 2017, another CDIC resolution tool, bail-in, was introduced. The resolution process and provisions under the CDIC Act ensure that an institution may remain open and operating during resolution proceedings or restructuring. Payments Canada's bylaws are being amended to ensure flexibility to support a potential resolution scenario.

Standard 15: General Business Risk

An FMI should identify, monitor and manage its general business risk and hold sufficient liquid net assets funded by equity to cover potential general business losses so that it can continue operations and services as a going concern if those losses materialize. Further, liquid net assets should at all times be sufficient to ensure a recovery or orderly wind-down of critical operations and services.

The board-approved ERM policy sets out the roles and responsibilities for risk management and risk governance. Payments Canada follows a three lines of defense approach (for more information please see Standard 3). General business risk follows the structure instituted in the ERM policy. Payments Canada identifies and monitors its general business risks through various mechanisms, including the risk profile, the IRC, business continuity program, security program, and implementation of the technology strategy.

Since Payments Canada is not funded by equity, there is no requirement for Payments Canada to calculate the amount of liquid net assets funded by such equity to cover general business losses. To cover losses, Payments Canada has at its disposal the following funds to maintain financial and operational strength and viability in severe stress scenarios.

[4] A bridge institution is an institution created by a regulator (CDIC) to assume the assets and liabilities, in whole or in part, of a failing institution – to help preserve critical functions while stabilizing and restructuring the institution.

Unrestricted Net Assets Reserve:

- This fund was established by the board in 2004. In the first few years, amounts for reserve were included in its costs when establishing Payments Canada's operating and capital budgets. In addition, the majority of the surplus funds realized in a fiscal year have been allocated to the general reserve.

Restricted Net Assets Reserve:

- The purpose of the fund is to support continued operation and services of the LVTS in the event that it incurs a general business loss. The fund was established to cover six months of operating costs in the event of a significant business interruption.

Payments Canada's investment policy sets out that liquidity and safety of principle are the key investment criteria for reserve funds. Payments Canada does not hold resources designated to cover the default of a member. Participants pledge collateral to the Bank of Canada to cover their default.

In alignment with payments Canada's ERM policy, the financial recovery plan aims to enhance resilience and strengthen confidence in Payments Canada's ability to function effectively even under severe financial stress scenarios. With continuous improvement in mind and aligned with the Bank of Canada expectations, Payments Canada is prioritizing strengthening its general business risk management through continuous enhancements to its financial recovery plan. As the plan is an evolving document, it is reviewed and approved by the board on an annual basis.

The ultimate objective for recovery planning is to enable Payments Canada to continue provision of critical services when its viability as a going concern is threatened. Achieving this objective requires assessing and documenting recovery options, which would be available to Payments Canada in severe stress situations.

As mentioned above, Payments Canada has at its disposal to cover losses two reserve funds to cover losses and maintain financial and operational strength and viability in severe stress scenarios. Payments Canada's legislative framework also delineates which recovery resources are available to Payments Canada to restore financial and operational strength and viability in severe stress scenarios.

Under By-law No. 2 – Finance, Payments Canada's Board has the ability to make significant amendment(s) to the operating budget or capital expenditures budget for a fiscal year, and therefore adjust the common services dues and transaction fees payable for the fiscal year on the basis of the amendment(s).

The CP Act, Section 17, subject to bylaws, states that the board may borrow money on the credit of Payments Canada; issue, reissue, sell or pledge debt obligations of Payments Canada; mortgage, pledge or otherwise create a security interest in all or any property of Payments Canada owned or subsequently acquired to secure any obligation of Payments Canada.

The affairs of Payments Canada may only be wound up by Parliament. With continuous improvement in mind and on a yearly basis, the Financial Recovery Plan is tested to ensure Payments Canada's preparedness in the event of a financial stress even

Standard 16: Custody and investment risks

An FMI should safeguard its own and its participants' assets and minimize the risk of loss on and delay in access to these assets. An FMI's investments should be in instruments with minimal credit, market and liquidity risks.

Payments Canada holds its cash in a chartered Canadian bank that is regulated by the Office of the Superintendent of Financial Institutions (OSFI) and insured through CDIC.

Payments Canada's investment policy ensures that Payments Canada's investment strategy is consistent with overall risk-management strategy and that liquidity of investments and safety of principal are adhered to. Payments Canada has adopted a very strict investment policy that limits its investment selection to Government of Canada Treasury Bills. The investment policy is reviewed on a regular basis by the Audit and Finance Committee and approved by the board.

Standard 17: Operational risk

An FMI should identify the plausible sources of operational risk – both internal and external – and mitigate their impact through the use of appropriate systems, policies, procedures and controls. Systems should be designed to ensure a high degree of security and operational reliability and should have adequate, scalable capacity. Business continuity management should aim for timely recovery of operations and fulfilment of the FMI's obligations, including in the event of a wide-scale or major disruption.

Payments Canada employs a framework of policies and procedures for the LVTS, supported by the LVTS bylaw and rules, which work to identify and mitigate the impact of operational risks. The framework, founded upon industry and cross-industry standards on security and risks, as well as Canadian and international standards and best practices, includes Payments Canada's ERM policy, business continuity program and an operational report provided to the Bank of Canada. Payments Canada also developed and implemented a formal vendor risk management procedure to identify, evaluates and manage risks that are brought on by outsourcing key activities to third party services providers.

The system design of LVTS incorporates various controls and clearly defines roles, procedures and incentives to manage and contain operational risks. This framework and its associated policies and procedures are reviewed and tested regularly through an external audit and disaster recovery and business continuity plan exercises. Operational reliability is provided through the LVTS availability commitments imposed on both participants and Payments Canada and the technical competency requirements expected of participants.

Operational reliability is ensured through the LVTS availability commitments imposed on both participants and Payments Canada, and the technical competency requirements expected of participants. Security and reliability are enforced by Payments Canada's maintenance of two active data centers for the LVTS, from which Payments Canada may resume processing within one hour in the event of a disruption. Payments Canada performance in meeting its operational objectives is assessed annually in the corporate scorecard.

Cyber security requires ongoing vigilance, monitoring and enhancements to processes, controls and procedures to effectively respond to new and evolving cyber threats. Payments Canada embarked in a multiyear cyber security enhancement program focusing initially on executing its cyber security action plan by closing internal gaps, improving engagement in the cyber community and making improvements in the five framework areas of identify, protect, detect, respond and recover.

Standard 18: Access and participation requirements

An FMI should have objective, risk-based and publicly disclosed criteria for participation, which permit fair and open access.

The LVTS bylaw and rules, which are publicly disclosed, clearly set out the criteria for becoming a participant in the LVTS, as well as procedures for suspension or revocation of participant status. The bylaw is approved by the minister of finance, while rules are approved by the Payments Canada Board of Directors and are subject to disapproval of the Minister of Finance. In addition, any new rules or changes to the rules or bylaw must be reviewed by the Bank of Canada. The participation requirements are in place to reflect the objectives of safety, soundness and efficiency of the LVTS. The compliance policy establishes guiding principles and framework for Payments Canada's risk-based approach to compliance. The compliance policy is approved by the board and reviewed every two years.

Standard 19: Tiered participation arrangements

An FMI should identify, monitor and manage the material risks to the FMI arising from tiered participation arrangements.

The legal framework and rules and procedures for the LVTS are based on direct participation.

Any Payments Canada member that chooses not to be an LVTS participant may contract with an LVTS participant to process payments through the LVTS. Participants that process LVTS payments on behalf of other members must provide Payments Canada with a listing of all of the members for which it acts in this capacity. Payments Canada relies on the participants' strong risk controls in place to manage and mitigate any risks for indirect participation. There are no formal tiering or rights/responsibilities specifically assigned to indirect participants.

Risks attributable to indirect participants are managed through the LVTS risk controls and the rules that are in place for participants. LVTS participants manage the risks associated with their indirect participants through risk management frameworks set out in their internal policies and standards. Credit exposure to indirect participants is also managed through their internal processes. Non-participating financial institutions are treated similar to any corporate client.

Payments Canada defined an approach to monitoring tiered participation in the LVTS; the framework is defined in accordance with the regulatory requirements and underlying specificities of the LVTS. Under this framework, specific LVTS Participants reports on a semi-annual basis on the payment values and volumes they originate and receive via the LVTS on behalf of all unaffiliated, indirect participants for which they act as LVTS agent.

Standard 21: Efficiency and effectiveness

An FMI should be efficient and effective in meeting the requirements of its participants and the markets it serves.

The LVTS was developed by Payments Canada through a cooperative process involving the Bank of Canada and private sector financial institutions with due regard for business requirements, risk management needs, system rules and legal implications. LVTS operating procedures and hours of operation are designed to reflect the specific needs of Canadian users, markets and geography. All changes to rules and procedures are carried out in consultation with participant committees. Rule amendments are subject to the Canadian government's disapproval power.

The system is designed to optimize the amount of collateral necessary to support the use of intraday credit, while delivering real-time processing and finality of payment messages and certainty of settlement. LVTS payments are effected across six time zones in Canada, allowing users to transact business without fear of payments being reversed. The LVTS is a hybrid system that combines the benefits of an RTGS system with a multilateral netting system without all of the costs (mainly collateral) that full RTGS systems normally involve.

Payments Canada regularly gauges customer satisfaction in terms of effectiveness and efficiency by conducting member and stakeholder surveys, the results of which are shared with the board. Payments Canada also completes a corporate scorecard, which provides a simple and effective evaluation of Payments Canada's operational efficiencies and organizational successes. The scorecard measures Payments Canada system availability rates, financial results and progress on achieving strategic milestones. Operations reports and scorecard performance are reviewed quarterly by the Bank of Canada and Payments Canada Board, respectively, and the scorecard framework is reviewed annually.

Standard 22: Communication procedures and standards

An FMI should use, or at a minimum accommodate, relevant internationally accepted communication procedures and standards in order to facilitate efficient payment, clearing, settlement, and recording.

LVTS participants exchange messages using the Society for Worldwide Interbank Financial Telecommunication (SWIFT) system.

A subset of these messages that meet certain criteria are sent to the LVTS using SWIFT's FIN-Copy service and are subject to the LVTS risk controls before being authorized. The LVTS does not engage in cross-border operations.

Standard 23: Disclosure of rules, key procedures and market data

An FMI should have clear and comprehensive rules and procedures and should provide sufficient information to enable participants to have an accurate understanding of the risks, fees and other material costs they incur by participating in the FMI. All relevant rules and key procedures should be publicly disclosed.

The LVTS is supported by a comprehensive framework of rules and procedures, supported by federal legislation, which are all publicly available on Payments Canada's website. All changes to rules and procedures are carried out in consultation with participant committees and are subject to board and government approval.

New participants to the LVTS are provided with business and technical training by Payments Canada. Regularly scheduled LVTS committee meetings provide participants with the opportunity to discuss the operation of the system and address any questions related to the rules and procedures.

APPENDIX I: STANDARDS THAT DO NOT APPLY TO THE LVTS (NOT APPLICABLE)

Standard 6: Margin

A CCP should cover its credit exposures to its participants for all products through an effective margin system that is risk-based and regularly reviewed.

This standard applies to central counterparties.

Standard 10: Physical deliveries

An FMI should clearly state its obligations with respect to the delivery of physical instruments or commodities and should identify, monitor and manage the risks associated with such physical deliveries.

This standard applies to central securities depositories.

Standard 11: Central security depositories (CSD)

A CSD should have appropriate rules and procedures to help ensure the integrity of securities issues and minimize and manage the risks associated with the safekeeping and transfer of securities. A CSD should maintain securities in an immobilized or dematerialized form for their transfer by book entry.

This standard applies to central securities depositories.

Standard 12: Exchange-of-value settlement systems

If an FMI settles transactions that involve the settlement of two linked obligations (for example, securities or foreign exchange transactions), it should eliminate principal risk by conditioning the final settlement of one obligation upon the final settlement of the other.

The LVTS does not settle transactions that involve the settlement of two linked obligations.

Standard 14: Segregation and portability

A CCP should have rules and procedures that enable the segregation and portability of positions of a participant's customers and the collateral provided to the CCP with respect to those positions.

This standard applies to central counterparties.

Standard 20: FMI Links

An FMI that establishes a link with one or more FMIs should identify, monitor and manage link-related risks.

This standard does not apply to payments systems.

APPENDIX II: ACRONYMS

ACSS	Automated Clearing Settlement System
AFC	Audit and Finance Committee
ASO	Additional Settlement Obligations
CDCC	Canadian Derivatives Clearing Corporation
CDIC	Canada Deposit Insurance Corporation
CDS	Canadian Depository for Securities
CP Act	Canadian Payments Act
CPMI	Committee on Payments and Market Infrastructures
ELT	Executive Leadership Team
ERM	Enterprise Risk Management
FMI	Financial Market Infrastructure
HABS	High-Availability Banking System
IOSCO	International Organization of Securities Commissions
IRC	Internal Risk Committee
LVTS	Large Value Transfer System
MAC	Member Advisory Council
OSFI	Office of the Superintendent of Financial Institutions
PCS Act	Payment Clearing and Settlement Act
RTGS	Real Time Gross Settlement
SWIFT	Society for Worldwide Interbank Financial Telecommunication
USBE	US Dollar Bulk Exchange

APPENDIX III: LIST OF PUBLICLY AVAILABLE RESOURCES

PAYMENTS CANADA GENERAL INFORMATION

Governance	:	https://www.payments.ca/about-us/governance-risk
Member Advisory Council	:	**https://www.payments.ca/about-us/how-we-collaborate/member-advisory-council**
Stakeholder Advisory Council	:	https://www.payments.ca/about-us/how-we-collaborate/stakeholder-advisory-council
Payments Canada Clearing and Settlement Systems Rules	:	https://www.payments.ca/about-us/our-systems-and-rules
Membership	:	https://www.payments.ca/our-directories/member-financial-institutions

ACTS AND BYLAWS

Canadian Payments Act	:	http://laws.justice.gc.ca/eng/acts/C-21/page-1.html
Large Value Transfer System (LVTS) Rules	:	https://www.payments.ca/about-us/our-systems-and-rules/large-value-transfer-system/rules
Payments Canada Membership Requirements Regulations	:	http://laws.justice.gc.ca/eng/regulations/SOR-2001-476/index.html
CPA bylaw No. 1 - General bylaw	:	http://laws.justice.gc.ca/eng/regulations/SOR-2003-174/index.html
CPA bylaw No. 2 - Finance	:	http://laws.justice.gc.ca/eng/regulations/SOR-2003-175/index.html

CPA bylaw No. 3 - Payment Items & ACSS	http://laws.justice.gc.ca/eng/regulations/SOR-2003-346/index.html
CPA bylaw No. 6 - Compliance	http://laws.justice.gc.ca/eng/regulations/SOR-2003-347/index.html
CPA bylaw No. 7 - Respecting the Large Value Transfer System	http://laws.justice.gc.ca/eng/regulations/SOR-2001-281/index.html
CPA bylaw No. 8 - Administration	https://www.payments.ca/sites/default/files/by-law-8-administration_0.pdf

STATISTICS

Large Value Transfer System	https://www.payments.ca/about-us/our-systems-and-rules/large-value-transfer-system/statistics

PAYMENTS CANADA MODERNIZATION

Modernization	https://modernization.payments.ca
Industry Roadmap & High-Level Plan	https://modernization.payments.ca/the-plan/
Modernization Target State	https://modernization.payments.ca/the-plan/
Modernization Delivery Roadmap	https://modernization.payments.ca/the-plan/