An Ode to the
Large Value Transfer System (LVTS)

operational from
February 1999 to August 2021
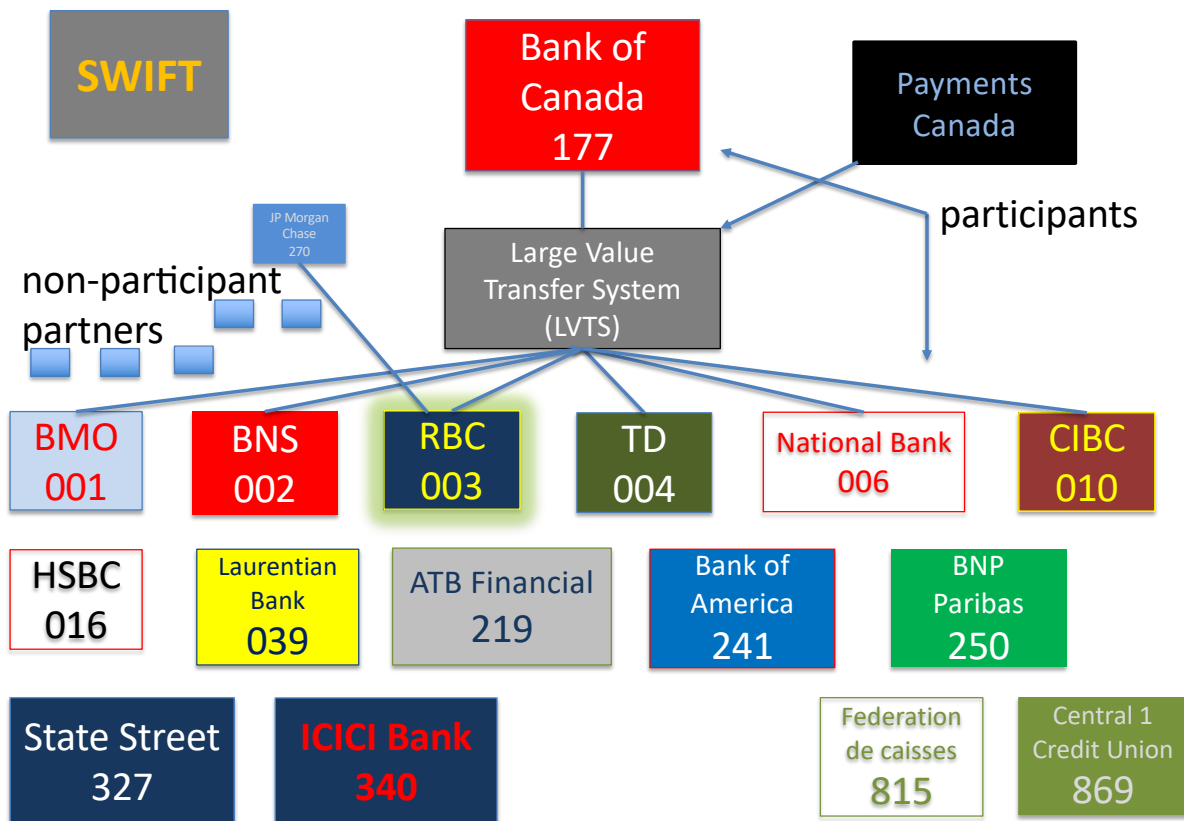
Clayton Bangsund
Founder & Editor

JuliusErwin

SWIFT

Bank of Canada 177

Payments Canada

participants

JP Morgan Chase 270

non-participant partners

Large Value Transfer System (LVTS)

BMO 001

BNS 002

RBC 003

TD 004

National Bank 006

CIBC 010

HSBC 016

Laurentian Bank 039

ATB Financial 219

Bank of America 241

BNP Paribas 250

State Street 327

ICICI Bank 340

Federation de caisses 815

Central 1 Credit Union 869

Wholesale System

The LVTS processed fewer payment transactions than the ACSS, but these transactions were typically much larger in value. Examples include:

- wire payments
- payments relating to securities trades
- government debt payments
- ACSS settlement payments

Credit Push

The LVTS was a credit push system.

A sending participant initiated the payment process by sending a payment message to the LVTS via SWIFT.

SWIFT
Society for Worldwide Interbank Financial Telecommunication

SWIFT is headquartered in Brussels, Belgium. It is the "global provider for secure financial messaging services".

To learn more about SWIFT, visit www.swift.com

LVTS ≠ Real Time Gross Settlement System (RTGSS)

"Of course, unlike the case of a real time, gross settlement system, settlement in the LVTS occurs only once each business day, at the end of the day's message exchanges."

—Crawford, *Payment, Clearing and Settlement in Canada*

Benefits & Drawbacks of a RTGSS

"The primary solution adopted by virtually all G-10 countries was the implementation of Real Time Gross Settlement (RTGS) systems. Each payment processed by these systems involves an immediate transfer of funds across participants' accounts held with the settlement institution (usually the central bank). That is, each payment is settled on a gross (individual) basis in real time. Under this arrangement, exposure to credit and liquidity risk is avoided, and systemic risk is eliminated. Moreover, immediate intraday finality is achieved, and beneficiaries of payments do not have to worry that funds could be revoked or unwound at some future time. Participation in an RTGS system is more costly relative to a traditional DNS system, however, since participants must maintain sufficient funds in their settlement account to send each payment through the system. Where participants' liquidity needs may be greater than the supply of funds in their settlement account, they can typically borrow additional funds from the central bank through intraday credit, which is generally provided on a fully collateralized basis."
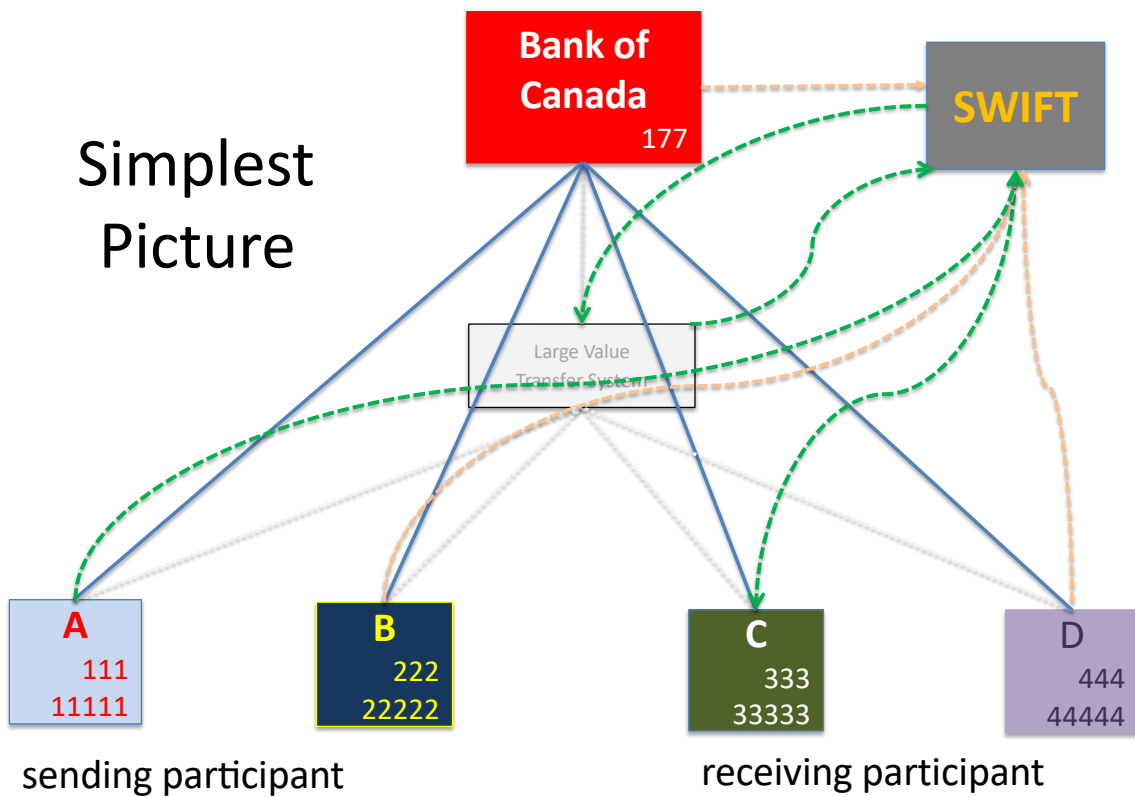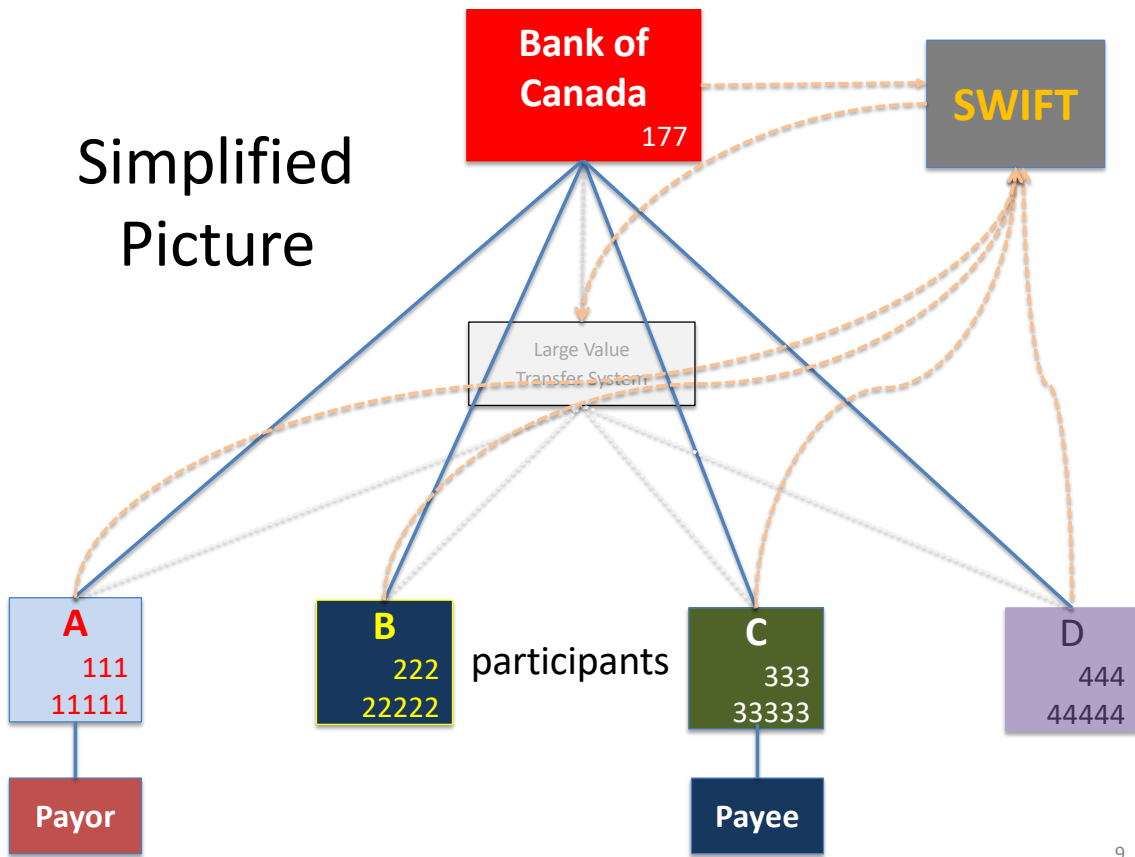
— Arjani & McVanel, *LVTS Primer*

LVTS v. RTGSS

"In the LVTS, payments are also processed with finality on a gross basis in real time, while settlement of the system occurs on a multilateral net basis at the end of the payments cycle. The LVTS's real time risk controls, coupled with both its collateral arrangements and a Bank of Canada residual guarantee, serve to ensure that the LVTS will settle under all circumstances. As a result, beneficiaries of payments in the LVTS are also able to use these funds immediately upon receipt, knowing that they will not be revoked or unwound in the future. In this respect, the LVTS is an RTGS-equivalent payment system. At the same time, a survivors-pay collateral pool in the T2 payment stream reduces collateral requirements and related costs with respect to the provision of intraday credit compared with traditional RTGS arrangements. Thus, the LVTS represents a more efficient design (from a cost-minimization perspective) than traditional RTGS systems."

— Arjani & McVanel

Simplified Picture

Bank of Canada 177

SWIFT

Large Value Transfer System

A 111 11111

Payor

B 222 22222

participants

C 333 33333

Payee

D 444 44444

Simplest Picture

Bank of Canada 177

SWIFT

Large Value Transfer System

A 111 11111

sending participant

B 222 22222

C 333 33333

receiving participant

D 444 44444

CPA Bylaw No. 7

Except where otherwise specified, section and subsection references in this slideshow are to *CPA By-law No. 7 Respecting the Large Value Transfer System*.
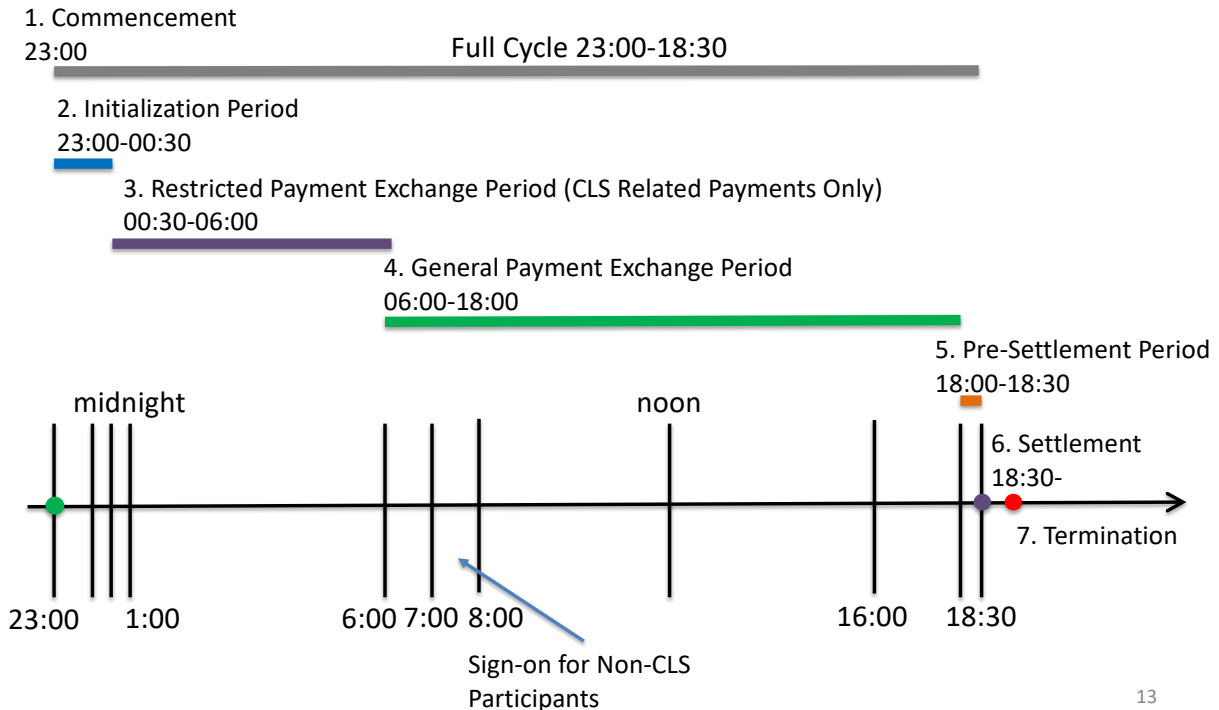
LVTS cycle; s. 1

LVTS cycle means the period of time beginning with the initialization of the LVTS on a business day and ending with the next settlement at the Bank of Canada of the multilateral net positions of all participants.

Timeline
Eastern Standard Time (EST)

1. Commencement
23:00   Full Cycle 23:00-18:30

2. Initialization Period
23:00-00:30

3. Restricted Payment Exchange Period (CLS Related Payments Only)
00:30-06:00

4. General Payment Exchange Period
06:00-18:00

5. Pre-Settlement Period
18:00-18:30

midnight   noon

6. Settlement
18:30-

7. Termination

23:00   1:00   6:00 7:00 8:00   16:00 18:30
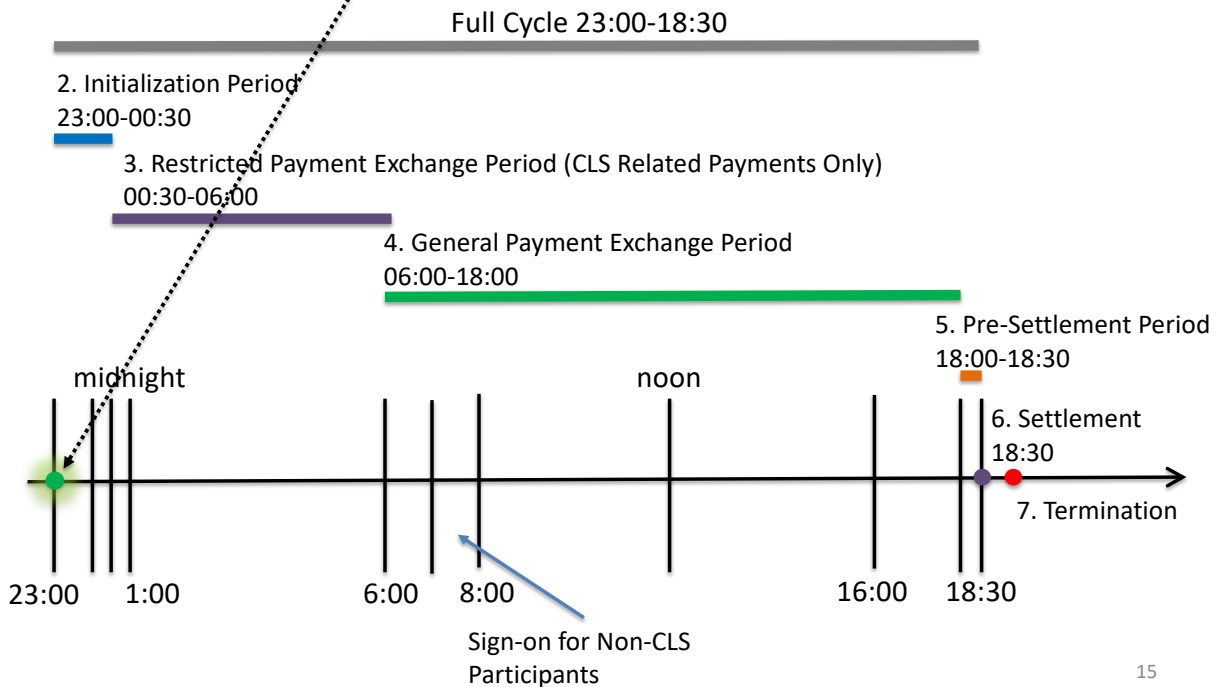
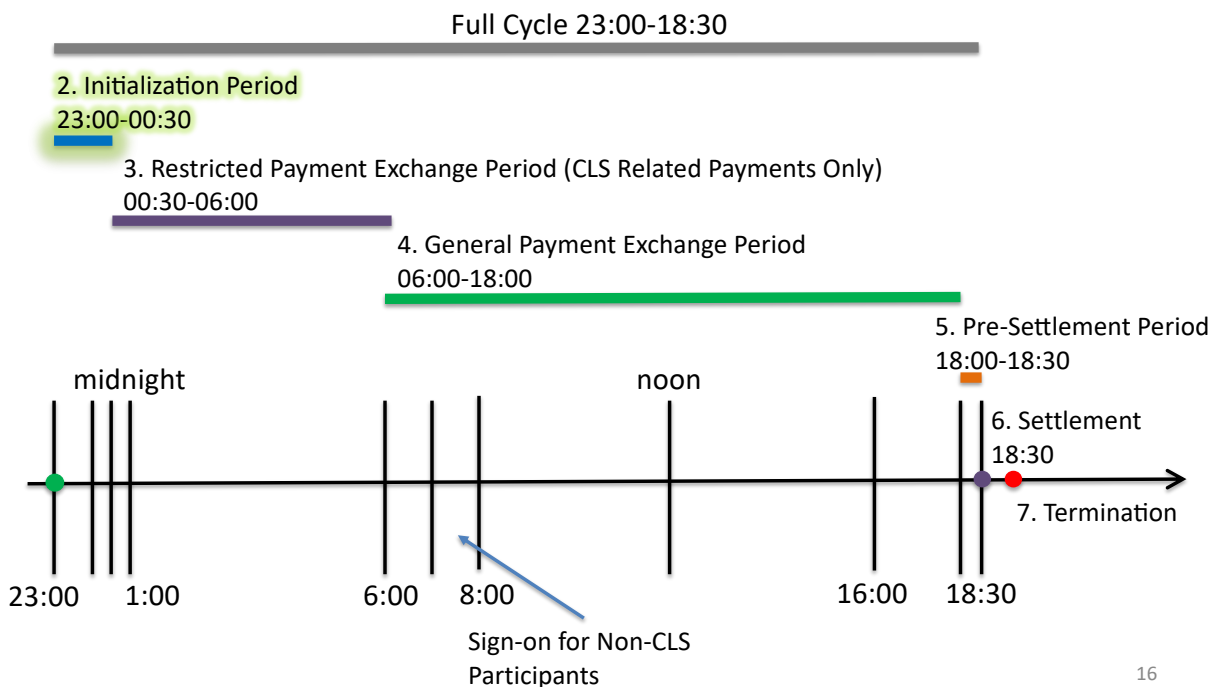Sign-on for Non-CLS
Participants

LVTS operation; s. 5(1)

The LVTS shall be operational on all business days and available to all participants whose LVTS status has not been revoked or suspended.

1. Commencement: 11pm EST

Full Cycle 23:00-18:30

2. Initialization Period
23:00-00:30

3. Restricted Payment Exchange Period (CLS Related Payments Only)
00:30-06:00

4. General Payment Exchange Period
06:00-18:00

5. Pre-Settlement Period
18:00-18:30

midnight   noon

6. Settlement
18:30

7. Termination

23:00   1:00   6:00 8:00   16:00 18:30

Sign-on for Non-CLS
Participants

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2. Initialization Period: 11pm-12:30am EST

Full Cycle 23:00-18:30

2. Initialization Period
23:00-00:30

3. Restricted Payment Exchange Period (CLS Related Payments Only)
00:30-06:00

4. General Payment Exchange Period
06:00-18:00

5. Pre-Settlement Period
18:00-18:30

midnight   noon

6. Settlement
18:30

7. Termination

23:00   1:00   6:00 8:00   16:00 18:30

Sign-on for Non-CLS
Participants

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Collateral

To support payments in both tranches 1 and 2, each participant must pledge (i.e. post, or grant) collateral to the Bank of Canada during the initialization period.

pledge = grant; s. 1

pledge means a grant to the Bank of Canada of a security interest in collateral as security for any advances of funds that the Bank of Canada may make for the purposes described in section 30 and includes a grant of a security interest in which the Bank of Canada does not take possession of the collateral.

Eligible Collateral

"Eligible collateral ranges from debt securities issued by the federal and provincial governments, to high-quality corporate and municipal debt instruments. Additional pledging restrictions apply to certain types of instruments, as described below."
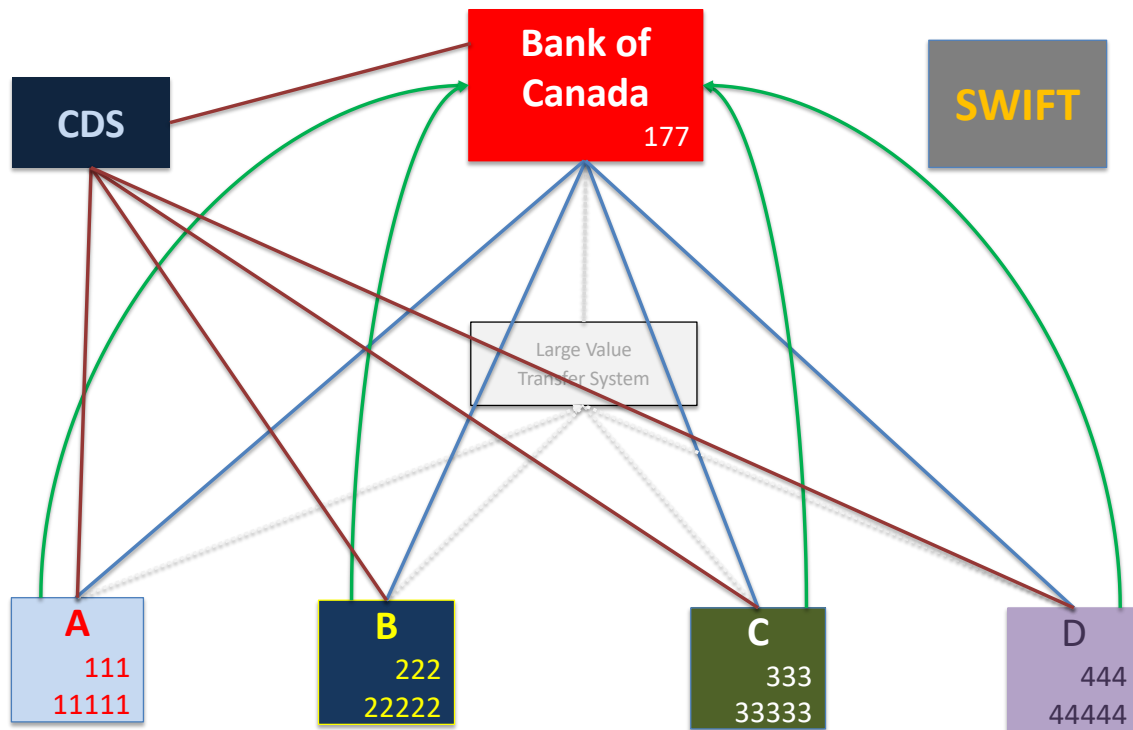
<div align="right">—Arjani & McVanel</div>

Method

"Participants' collateral securities earmarked for LVTS activity are pledged to the Bank of Canada using an electronic book-entry process within CDSX."

<div align="right">—Arjani & McVanel</div>

Collateral Rules & Restrictions

- Only Canadian-dollar-denominated securities are eligible to be pledged as collateral;

- Securities used as collateral must be pledged to the Bank of Canada in a book-entry format using CDSX, or be physically delivered to the Bank in certificated form;

- No more than 20 per cent of the value of the collateral pledged by an institution should be the obligation of a single private sector issuer or related party. This condition does not apply for borrowings of less than $50 million;

- An institution may not pledge collateral issued by it or an issuer affiliated with it;

- The Bank of Canada must be notified 24 hours in advance (with a deadline of 15:00 hours E.T.) by the borrowing institution the first time it intends to pledge any private sector security for use as collateral the next day. At the time of notice the institution must also provide the relevant credit ratings of the security;

- The security must not have an embedded option or carry a right of conversion into equity securities;

- A minimum principal amount of $1 million of an individual security is required.

– Arjani & McVanel, *LVTS Primer*

Haircuts

"To control market risk, the Bank of Canada applies haircuts when valuing pledged securities. The current framework used by the Bank to determine appropriate haircuts is a "bucketed" approach that focuses on broad classes of issuers and asset characteristics. This framework is relatively simple to implement and is aligned with market trading practices and, in general, with the practices of other central banks. More importantly, it allows the Bank to avoid making judgments regarding the liquidity or credit quality of securities issued by any particular borrower."

<div align="right">

— Arjani & McVanel, *LVTS Primer*

</div>

Haircut Discounting Factors

"Haircuts are typically larger the lower the class of issuers' credit rating and the longer the term to maturity of the asset. Specifically, haircuts applied to a particular class of asset reflect the following factors: the estimated amount of time necessary to liquidate holdings of the asset (immediacy); the chance that liquidation could affect the asset's market price (depth); and overall confidence in the accuracy of the asset's market price."

<div align="right">

— Arjani & McVanel, *LVTS Primer*

</div>

Tranche 1

During initialization, each participant must decide how much it expects to make in tranche 1 payments during the daily cycle. The amount it designates is referred to as the tranche 1 net debit cap (T1NDC).

tranche 1 net debit cap (T1NDC); s. 1

tranche 1 net debit cap means, for each participant, the maximum negative amount, calculated in accordance with section 19, of its multilateral net tranche 1 position, except that the tranche 1 net debit cap for the Bank of Canada is unlimited.

Full Collateralization

"Tranche 1 payments are 100% collateralized. Each Tranche 1 payment *made* by a participant reduces the amount of Tranche 1 credit available for additional Tranche 1 payments, and each Tranche 1 payment *received* by a participant from another participant replenishes the available Tranche 1 credit in an amount equal to the amount of the payment received."

—Crawford, *Payment, Clearing and Settlement in Canada*

Bank of Canada Exception

"When acting on its own behalf as a sender of payment messages, Bank of Canada has an infinite Tranche 1 net debit cap and has no obligation to provide collateral in support of it. This is apparently based on the theory that the central bank has infinite liquidity, and there could never arise a situation in which the system administrators would have to resort to the Bank's collateral in order to discharge its defaulted obligations."

—Crawford, *Payment, Clearing and Settlement in Canada*
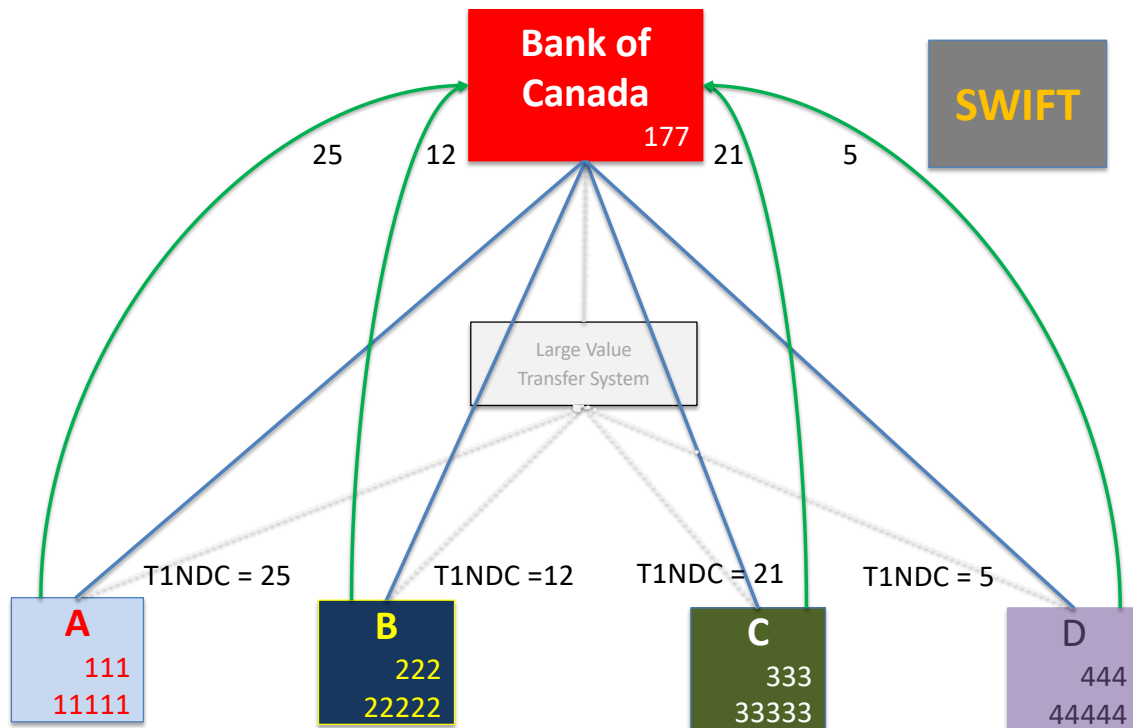
Each participant must post collateral, dollar for dollar, to the Bank of Canada.

Defaulter Pay

"If the participant were to fail immediately after the payment message was approved and confirmed to the receiving bank, Bank of Canada would have enough marketable collateral pledged to it to enable it to settle all the failed participant's outstanding LVTS payment obligations on its behalf, without calling on credit or collateral from any other participant."

— Crawford, *Payment, Clearing and Settlement in Canada*

Tranche 2

Also during initialization, each participant sets a tranche 2 bilateral credit limit with each of the other participants, and pledges eligible collateral to the Bank of Canada in an amount equal to its maximum ASO (calculated with reference to the largest bilateral credit limit it sets for other participants), *infra*.

Zero-Rating

"Some participants may set their bilateral credit limit for a particular participant at zero. They would have good reason to do so if they suspect that the participant might fail that day since their ASO is proportionate to the amount of credit they fix for the defaulting participant that day, whether or not that credit is used. The downside is all on the other participant."

—Crawford, *Payment, Clearing and Settlement in Canada*

Effect of Zero-Rating

"If a participant has set its Tranche 2 bilateral credit limit for another participant at zero, it cannot receive any Tranche 2 payment messages from that participant that day. Accordingly, any payment message that the zero-rated participant is obliged to send in performance of its instructions from a customer will have to be a Tranche 1 payment."

—Crawford, *Payment, Clearing and Settlement in Canada*

Reciprocity

"Bilateral credit limits between pairs of participants need not be reciprocal (although, in practice, they tend to be reciprocal), and participants have a choice of granting a BCL of zero to another participant."

—Arjani & McVanel

Bank of Canada BCL

"The Bank of Canada also grants a BCL to each participant that equals 5 per cent of the total sum of all BCLs granted to that participant by others in the system."
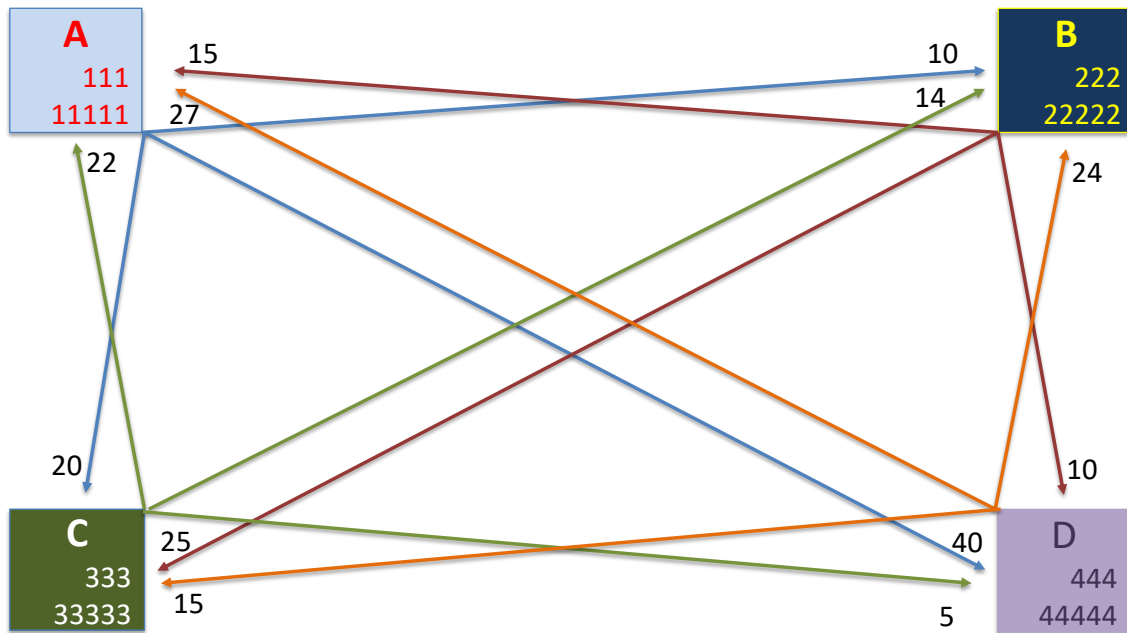
—Arjani & McVanel

tranche 2 net debit cap (T2NDC); s. 1

tranche 2 net debit cap means, for each participant, the maximum negative amount, calculated in accordance with section 23, of its multilateral net tranche 2 position.

A's tranche 2 net debit cap= 64(1.05) x 0.30 = 20.16

B's tranche 2 net debit cap= 48(1.05) x 0.30 = 15.12

A
111
11111

15
27
22

B
222
22222

10
14
24

20

10

C
333
33333

25
15

40
5

D
444
44444

C's tranche 2 net debit cap= 60(1.05) x 0.30 = 18.90

D's tranche 2 net debit cap= 55(1.05) x 0.30 = 17.33

system-wide percentage; s. 1

system-wide percentage means the percentage, of not less than 0 and not more than 100 per cent, set out in the rules, that is used for calculating a participant's maximum ASO and tranche 2 net debit cap.

LVTS Rule 2, Appendix I

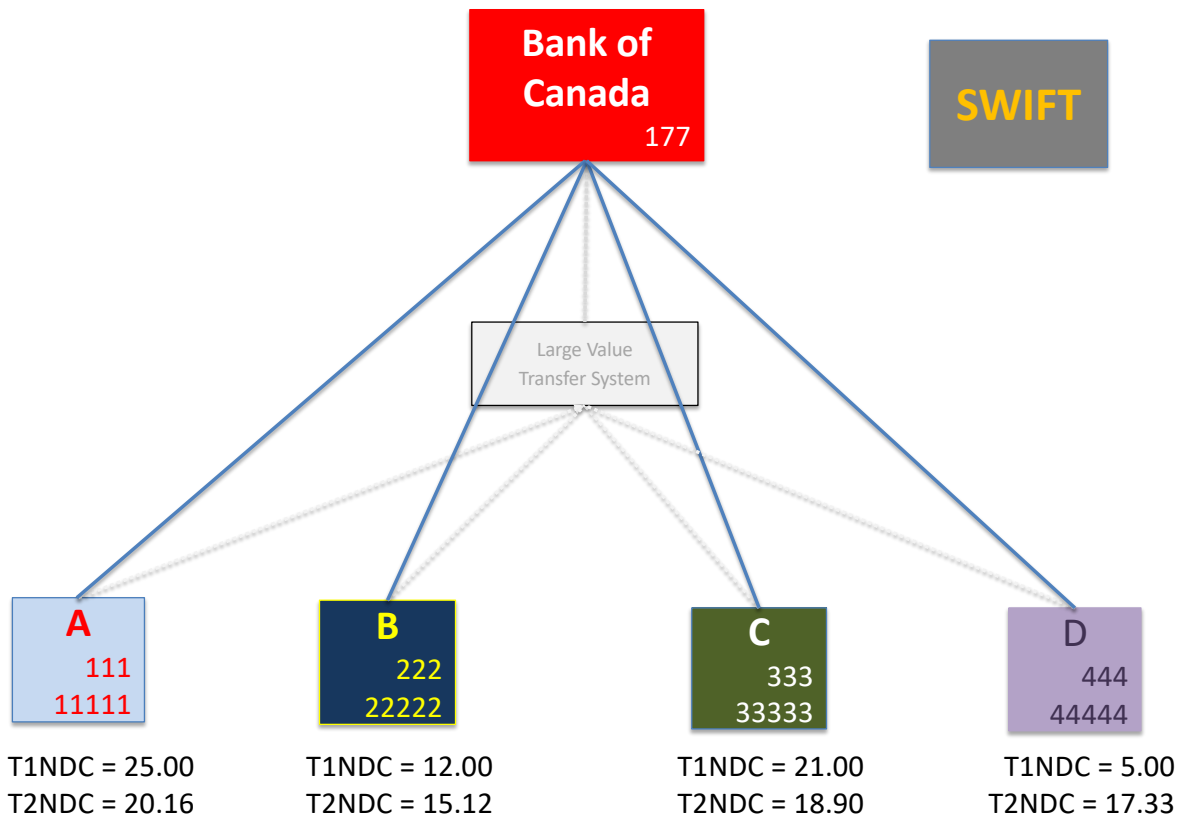The system-wide percentage is currently set at 30%, and has been since May 1, 2008.

Dual Importance

The system-wide percentage is useful for:

- 1. determining a participant's tranche 2 net debit cap (for LVTS risk-control testing during the payment cycle), and

- 2. determining the amount of collateral the participant must pledge to the Bank of Canada by the end of the initialization period.

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Large Value Transfer System

A	B	C	D
111	222	333	444
11111	22222	33333	44444
T1NDC = 25.00	T1NDC = 12.00	T1NDC = 21.00	T1NDC = 5.00
T2NDC = 20.16	T2NDC = 15.12	T2NDC = 18.90	T2NDC = 17.33

Incentive to Exercise Caution

An LVTS participant has incentive to exercise caution in granting bilateral credit limits to other participants because it must pledge additional collateral to Bank of Canada in an amount produced when the largest bilateral credit limit it grants to another participant is multiplied by the system-wide percentage.

maximum ASO; s. 28

The amount of a participant's maximum ASO is equal to the product of the largest bilateral credit limit established by that participant for any other participant, during the LVTS cycle, multiplied by the system-wide percentage.
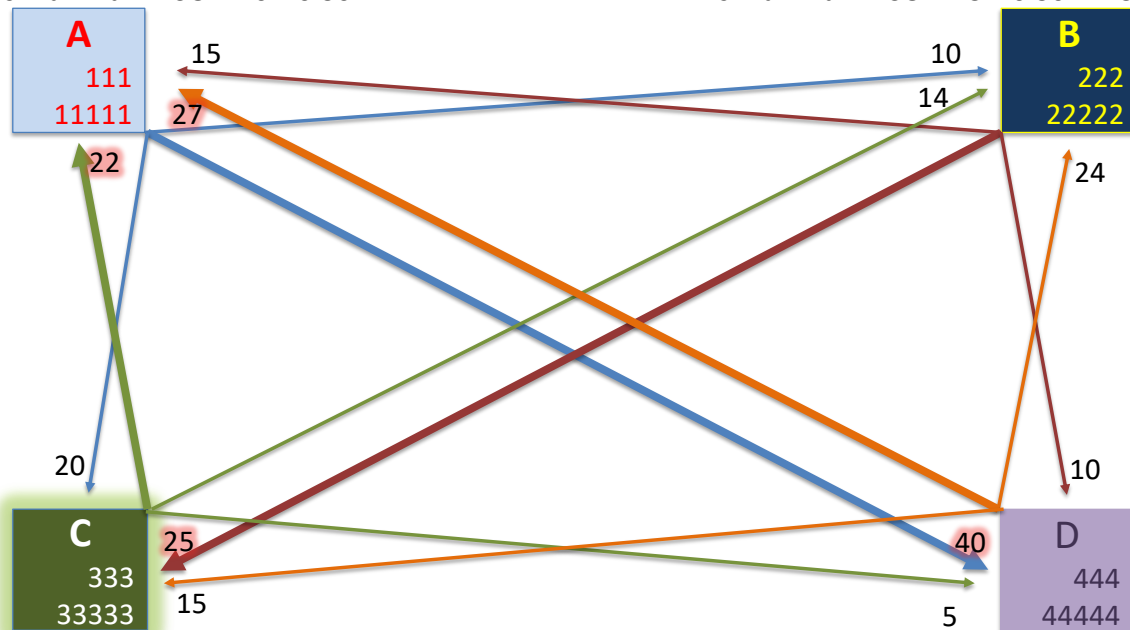
maximum ASO = largest bilateral credit limit x system-wide percentage

maximum ASO = largest BCL x 0.30

A's maximum ASO = 40 x 0.30 = 12

B's maximum ASO = 25 x 0.30 = 7.5

C's maximum ASO = 22 x 0.30 = 6.6

D's maximum ASO = 27 x 0.30 = 8.1

Survivors Pay

"In T2, a 'survivors-pay' collateral pool is used to facilitate settlement of the LVTS in the event of a participant default. Participants must apportion collateral equal to the largest BCL that they extend to any other participant, multiplied by the SWP. This results in there always being sufficient T2 collateral value apportioned to the LVTS to cover the largest possible T2 net debit position of any participant."
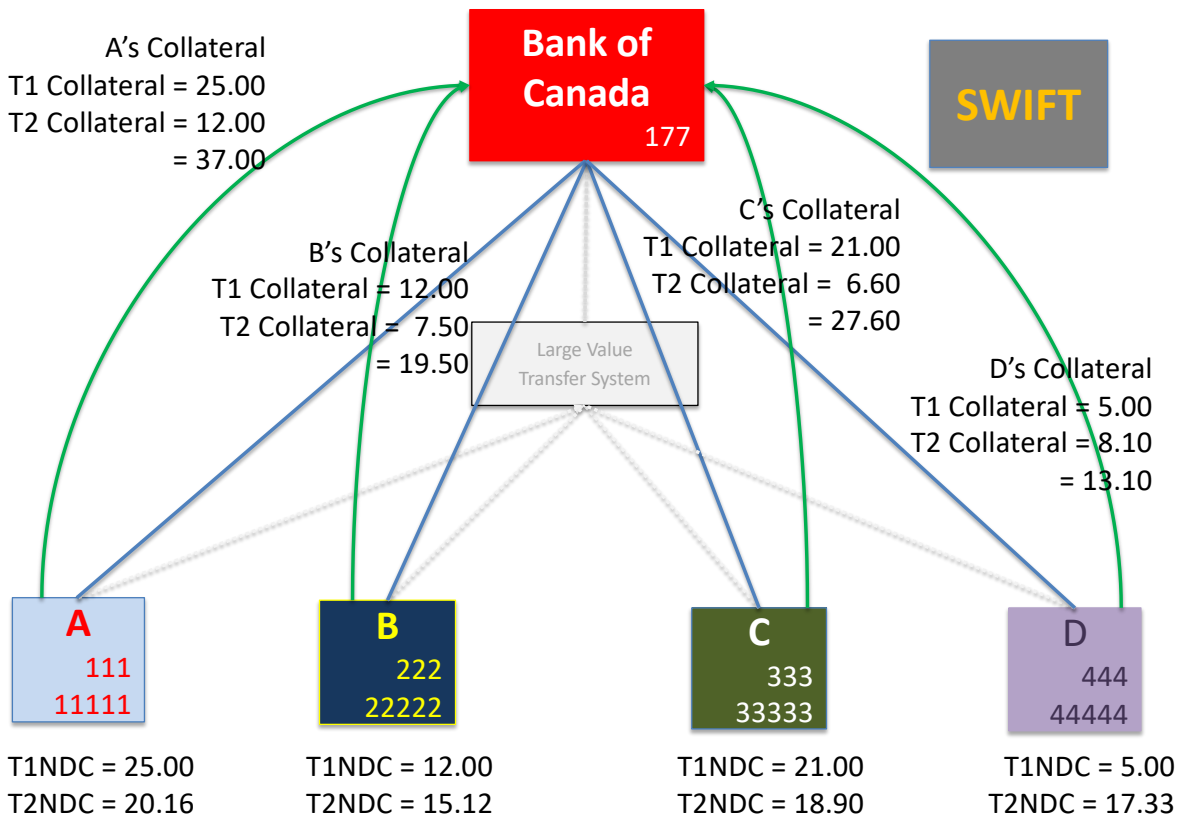
— Arjani & McVanel

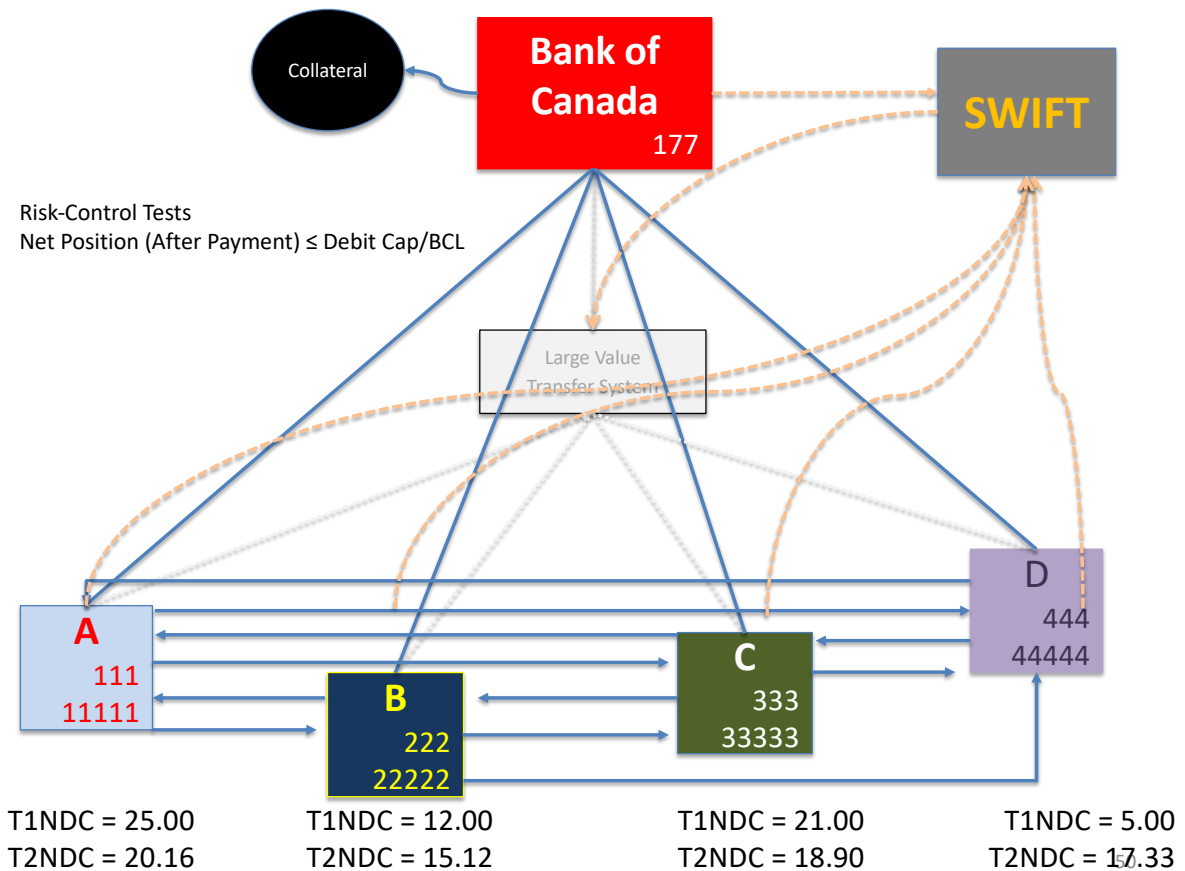# Collateral Requirements

collateral value > T1NDC + maximum ASO

A's Collateral
T1 Collateral = 25.00
T2 Collateral = 12.00
= 37.00

Bank of Canada
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SWIFT

B's Collateral
T1 Collateral = 12.00
T2 Collateral = 7.50
= 19.50

C's Collateral
T1 Collateral = 21.00
T2 Collateral = 6.60
= 27.60

Large Value Transfer System

D's Collateral
T1 Collateral = 5.00
T2 Collateral = 8.10
= 13.10

A
111
11111

B
222
22222

C
333
33333

D
444
44444

T1NDC = 25.00
T2NDC = 20.16

T1NDC = 12.00
T2NDC = 15.12

T1NDC = 21.00
T2NDC = 18.90

T1NDC = 5.00
T2NDC = 17.33

Credit Grantor	Bilateral Credit Limit Grantee				maximum ASO
	A	B	C	D	
A	-	10	20	40	40 x 0.3 = 12
B	15	-	25	10	25 x 0.3 = 7.5
C	22	14	-	5	22 x 0.3 = 6.6
D	27	24	15	-	27 x 0.3 = 8.1
BofC	3.2	2.4	3	2.75	Total Collateral 97.2
T2NDC	67.2 x 0.3 = 20.16	50.4 x 0.3 = 15.12	63 x 0.3 = 18.90	57.75 x 0.3 = 17.33	
T1NDC	25	12	21	5	

Payment Messages

Risk-Control Tests
Net Position (After Payment) ≤ Debit Cap/BCL

| Collateral | **Bank of Canada** 177 | | **SWIFT** |

Large Value
Transfer System

A
111
11111

B
222
22222

C
333
33333

D
444
44444

T1NDC = 25.00   T1NDC = 12.00   T1NDC = 21.00   T1NDC = 5.00
T2NDC = 20.16   T2NDC = 15.12   T2NDC = 18.90   T2NDC = 17.33

Tranches

A sending participant may send to receiving participants (including the Bank of Canada) Tranche 1 or Tranche 2 payment messages.

The Bank of Canada only sends Tranche 1 payment messages to other LVTS participants.

Running Tally

As payment messages are sent and received during the payment exchange period, the LVTS maintains, for each participant, its multilateral and bilateral net positions, which are then utilized in assessing subsequent payment messages pursuant to the applicable risk-control tests.

Assessment

When a sending participant sends a payment message – whatever type, Tranche 1 or Tranche 2 – to the LVTS via SWIFT, the LVTS assesses the payment instructions against the applicable risk-control tests, then:

(i)   accepts the payment message,

(ii)   rejects the payment message, or

(iii)   in some instances, places the payment message in the queue for further processing.

Confirmation

If the payment passes the applicable tests, the LVTS will issue a payment confirmation reference number (PCRN), and send an authorization message back to SWIFT, who will then forward the message to the receiving financial institution along with the PCRN.

pcrn; s. 1

payment confirmation reference number means a number attached by the LVTS to a payment message on passage of the risk control tests identifying the payment as one that has passed all risk control tests applicable to that payment.

Further Confirmation

SWIFT will also send a confirmation message back to the sending participant along with the PCRN. At this stage the payment is approved and is irrevocable and the receiving participant has a legal duty make the funds immediately available to the payee.
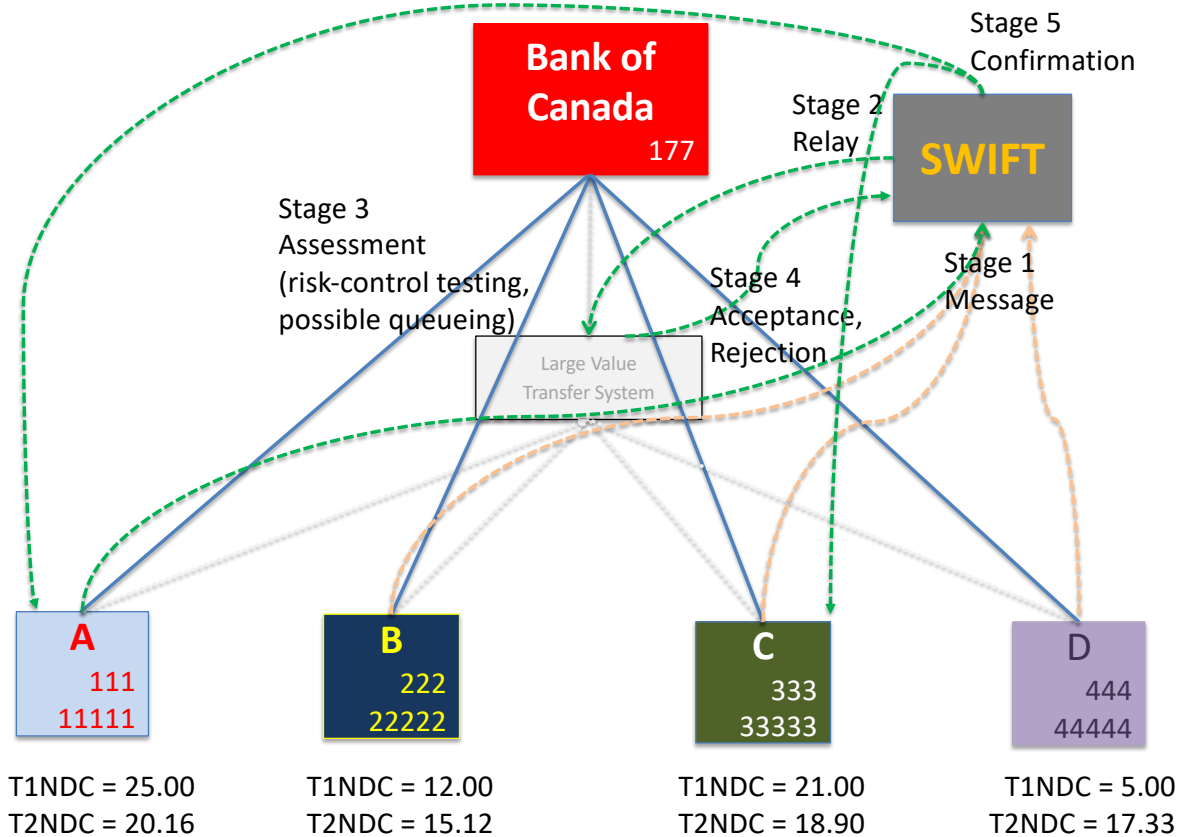
Tranche 1

A Tranche 1 payment message is subjected to one multilateral risk-control test.

Tranche 1 Risk-Control Test

A participant cannot send a Tranche 1 payment message that would result in its multilateral net tranche 1 position (in debit) exceeding its tranche 1 net debit cap.

Tranche 1 Assessment

Multilateral Test

Tranche 1 Payment − MNT1P ≤ T1NDC

Tranche 2

A Tranche 2 payment message is subjected to two real-time risk-control tests, one bilateral and one multilateral.

Acceptance

The LVTS will accept a Tranche 2 payment message if the payment will not result in the sending participant's net positions exceeding

- (a) its bilateral credit limit with the receiving participant, and
- (b) its tranche 2 net debit cap.

Rejection or Queue (Jumbo)

Conversely, LVTS risk management software will reject any tranche 2 payment message that would result in either such threshold being exceeded, or alternatively, it will queue the payment message if it is designated as a Jumbo payment.

LVTS Rule 2, Appendix I
LVTS Queue Parameters

LVTS Queue Parameters		Effective Date
Queuing Option	Jumbo Only	February 4, 1999
Jumbo Payment Threshold	$100,000,000.00	January 26, 2000
Jumbo Algorithm Frequency	15 minutes (start at 1:00 am)	December 5, 2005
Expiry Algorithm Frequency	30 minutes (start at 1:05 am)	May 28, 2007
Maximum Queue	35 minutes	May 28, 2007

Tranche 2 Assessment

Bilateral Test

Tranche 2 Payment – BNT2P ≤ BCL

Multilateral Test

Tranche 2 Payment – MNT2P ≤ T2NDC

absolute finality; s. 42

No adjustment, reversal or unwinding of any approved payment message may be made under any circumstances.

availability of funds; s. 43(1)

On actual receipt by a receiving participant of a payment message, the receiving participant shall make the amount of the payment message finally and irrevocably available to the payee on the earlier of

- (a) the end of the LVTS cycle, and
- (b) a reasonable request by the payee being made to the receiving participant for the amount of the payment message.
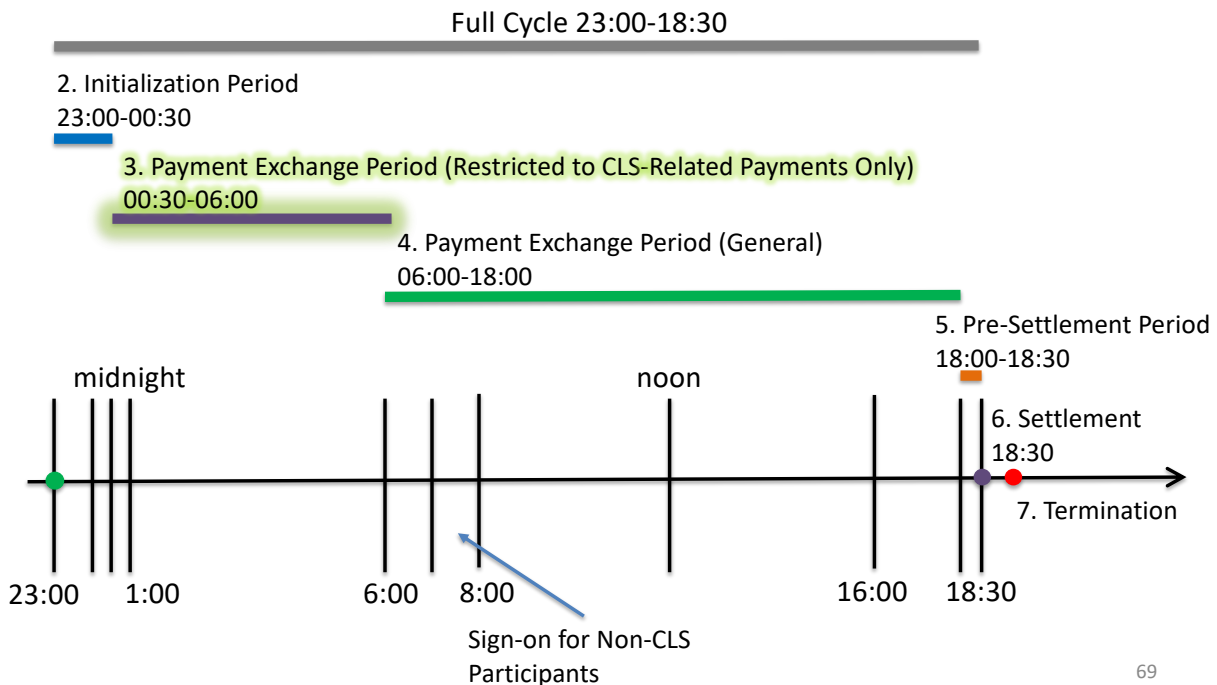
3. Restricted Payment Exchange Period

Open for Payment Processing (OPP)

CLS-Related Payments Only

00:30-06:00

CLS-Related Payments Only: 12:30-6:00am

Full Cycle 23:00-18:30

2. Initialization Period
23:00-00:30

3. Payment Exchange Period (Restricted to CLS-Related Payments Only)
00:30-06:00

4. Payment Exchange Period (General)
06:00-18:00

5. Pre-Settlement Period
18:00-18:30

6. Settlement
18:30

midnight

noon

7. Termination

23:00   1:00   6:00   8:00   16:00   18:30

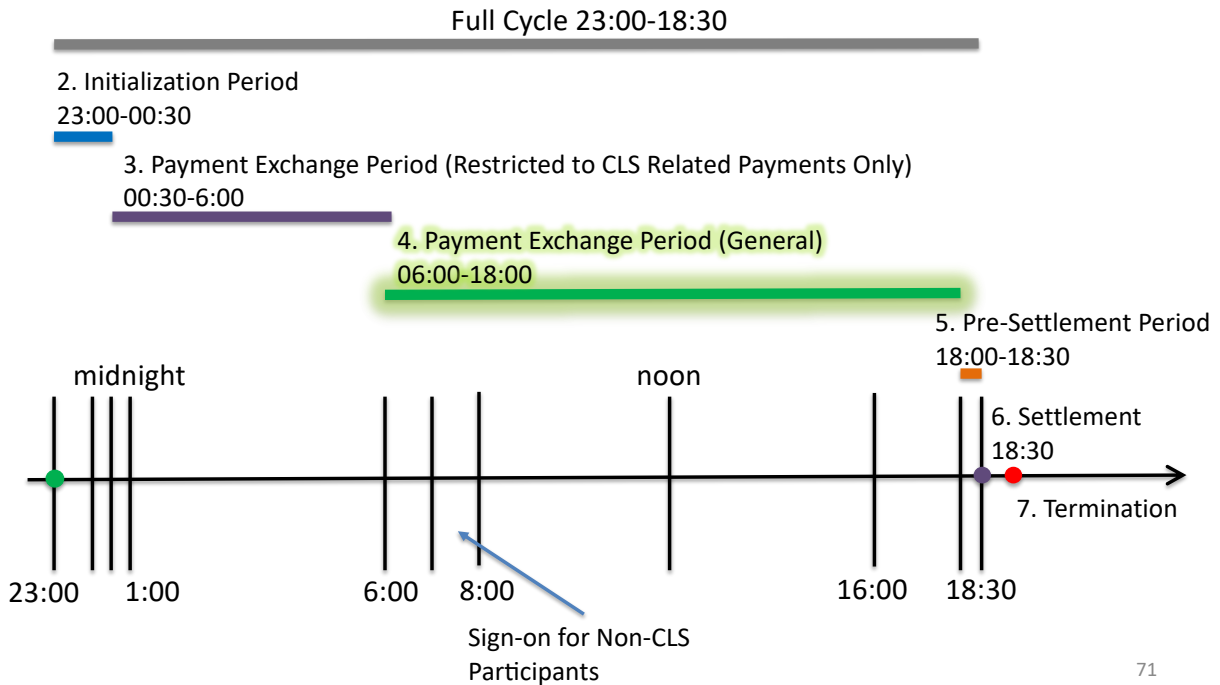Sign-on for Non-CLS
Participants

4. General Payment Exchange Period

Open for Payment Processing (OPP)
General Payment Exchange Period
06:00-18:00

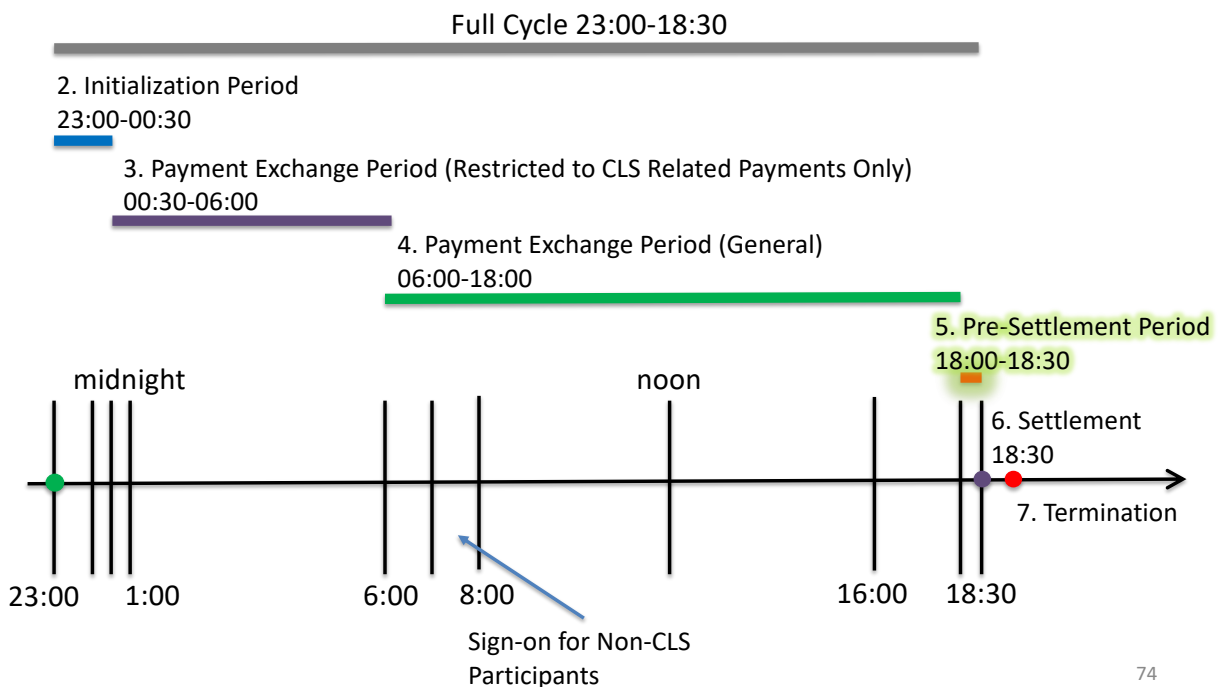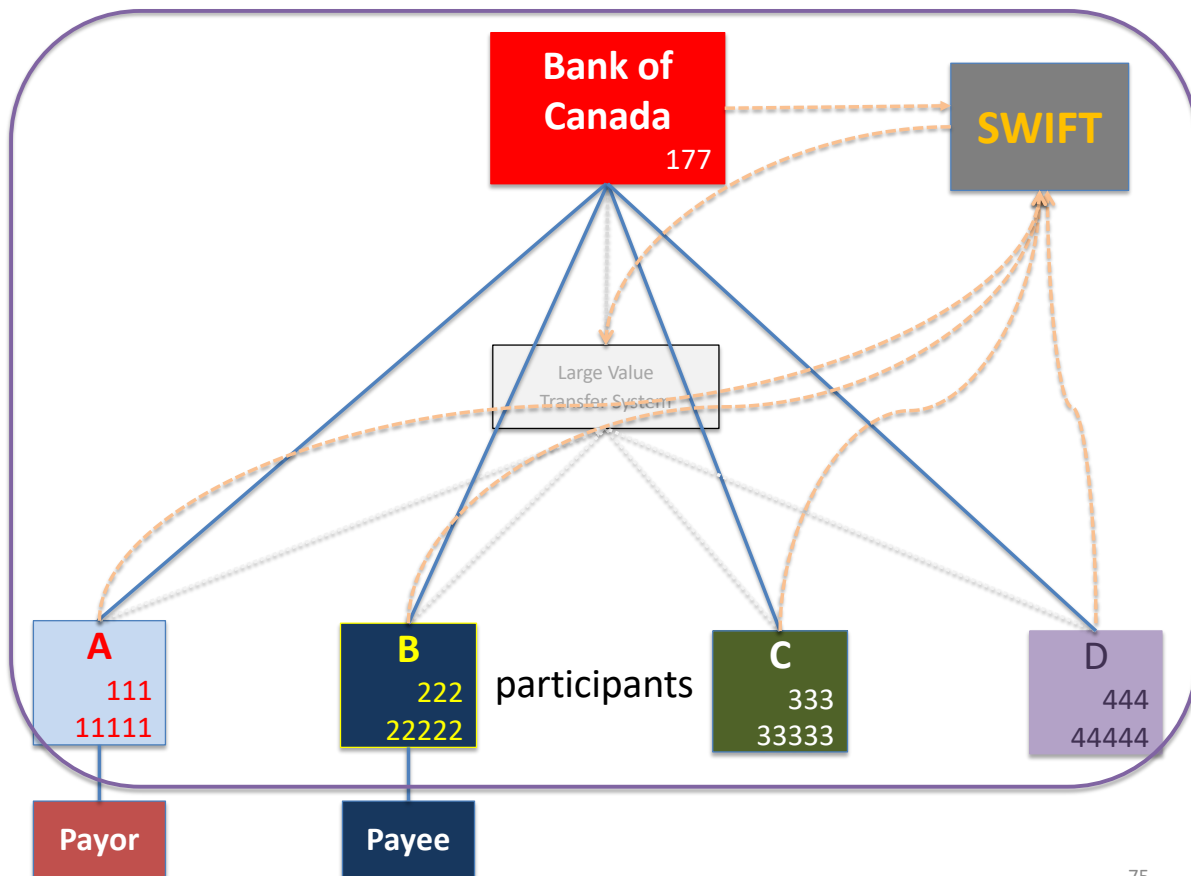# General Payment Exchange Period: 6:00am-6:00pm

Full Cycle 23:00-18:30

2. Initialization Period
23:00-00:30

3. Payment Exchange Period (Restricted to CLS Related Payments Only)
00:30-6:00

4. Payment Exchange Period (General)
06:00-18:00

5. Pre-Settlement Period
18:00-18:30

midnight   noon

6. Settlement
18:30

7. Termination

23:00   1:00   6:00   8:00   16:00   18:30

Sign-on for Non-CLS
Participants

Bank of Canada
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SWIFT

Large Value
Transfer System

A		C	D
111	B	333	444
11111	222	33333	44444
	22222		

participants

Payor

Payee

5. Pre-Settlement Period

Interparticipant Exchange Period
18:00-18:30

5. Pre-Settlement Period: 6:00-6:30pm

Full Cycle 23:00-18:30

2. Initialization Period
23:00-00:30

3. Payment Exchange Period (Restricted to CLS Related Payments Only)
00:30-06:00

4. Payment Exchange Period (General)
06:00-18:00

5. Pre-Settlement Period
18:00-18:30

6. Settlement
18:30

7. Termination

midnight   noon

23:00   1:00   6:00   8:00   16:00   18:30

Sign-on for Non-CLS
Participants

Overnight Lending Only

"Only transactions relating to overnight interbank lending are permitted during this time, and a sender of a payment (a participant with a net credit position) must not send a payment to another participant (in a net debit position) unless a formal agreement has been struck between the parties."
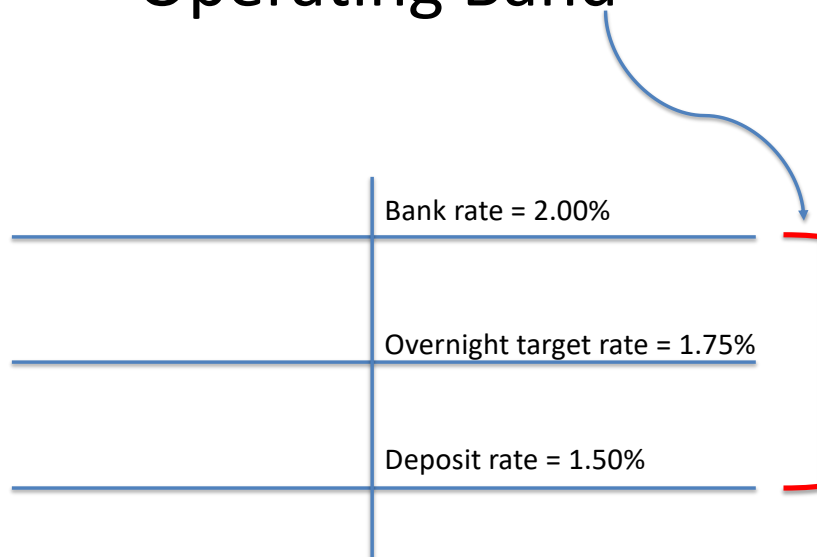
—Arjani & McVanel

Flattening Positions

During pre-settlement, participants may put into place interbank credit facilities in which the overnight interest rate is equal to or near the *midpoint* on the 50 basis-point band. These loans, issued through LVTS payments, flatten net positions in an effort to minimize overnight settlement balances with Bank of Canada.
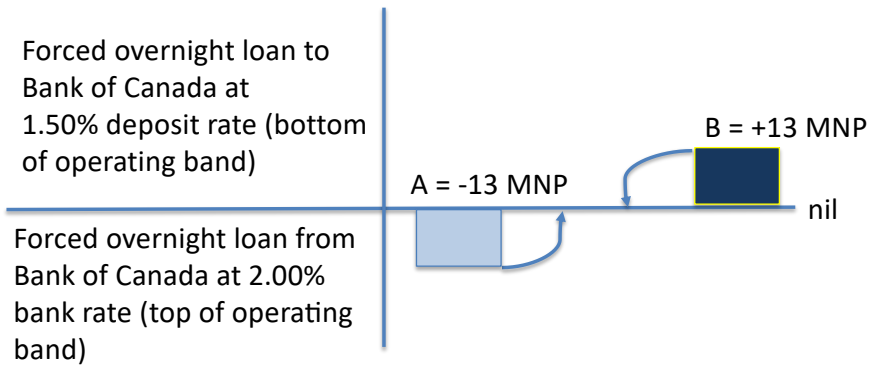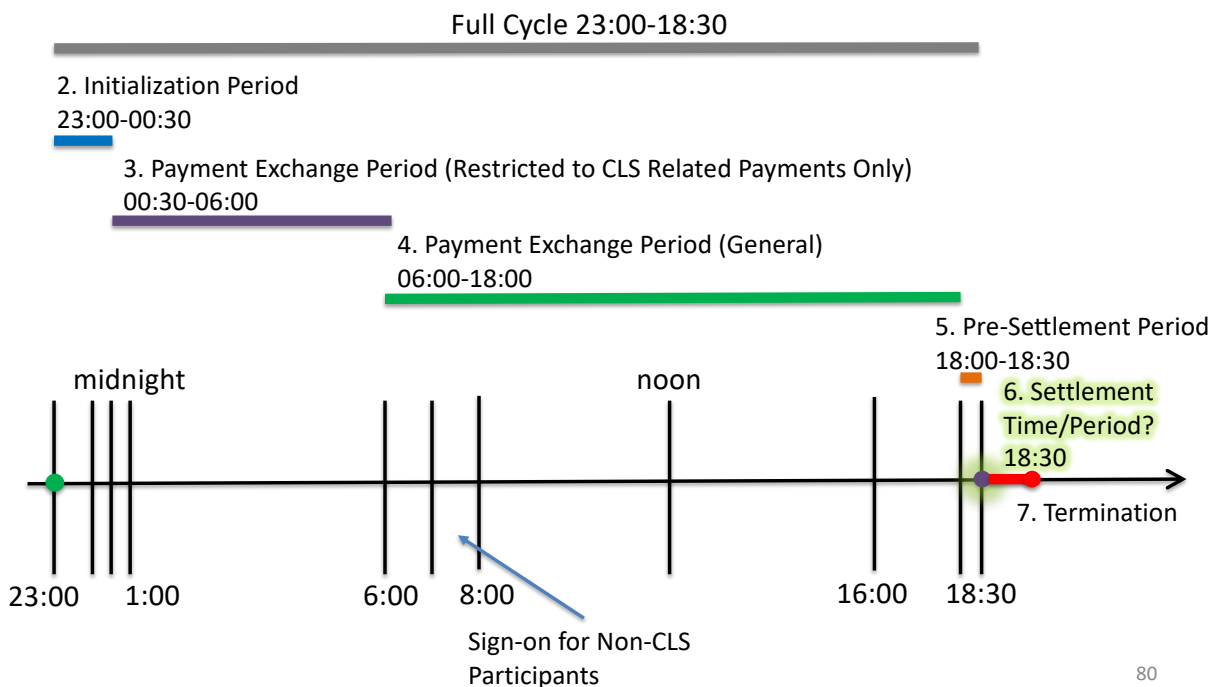
Operating Band

Bank rate = 2.00%

Overnight target rate = 1.75%

Deposit rate = 1.50%

Flattening

Forced overnight loan to Bank of Canada at 1.50% deposit rate (bottom of operating band)

B = +13 MNP

A = -13 MNP

nil

Forced overnight loan from Bank of Canada at 2.00% bank rate (top of operating band)

A has a MNP of -13 and B has a MNP of +13. To flatten positions, B may send a payment message to A in an amount of 13, representing an overnight loan bearing interest at or near the overnight target rate of 1.75%. Both parties win. B doesn't have to accept a low interest rate of 1.50% from the Bank of Canada, and A doesn't have to pay 2.00% interest to the Bank of Canada.

6. Settlement: 6:30pm

Full Cycle 23:00-18:30

2. Initialization Period
23:00-00:30

3. Payment Exchange Period (Restricted to CLS Related Payments Only)
00:30-06:00

4. Payment Exchange Period (General)
06:00-18:00

5. Pre-Settlement Period
18:00-18:30

midnight

noon

6. Settlement Time/Period?
18:30

7. Termination

23:00   1:00   6:00   8:00   16:00   18:30

Sign-on for Non-CLS Participants

Nature of Settlement

"Settlement of the LVTS occurs on a multilateral net basis at the end of the payments cycle. The LVTS employs multilateral netting by novation; once a payment obligation is accepted by the system, the sender's bilateral settlement obligation with the receiver is extinguished and is replaced by a multilateral settlement obligation vis-à-vis all other participants in the system."

— Arjani & McVanel

In Crawford's Words

"It is discharged by Bank of Canada posting a debit or credit entry, as appropriate, to that participant's settlement account with it. It is axiomatic that the net sum of all the debits and credits must be zero. Therefore, although there are no payments by individual participants to each other, the adjustment of their settlement balances by Bank of Canada has the effect of discharging all debts for that day's operation of the LVTS."

— Crawford, *Payment, Clearing and Settlement in Canada*

More Complicated Than Crawford Suggests

"LVTS participants do not retain funds in their settlement account at the Bank of Canada on a continuous basis. As a result, settlement begins with each participant that incurred a negative final net position applying for a fully secured overnight (SLF) advance from the Bank of Canada equal to the value of its position. If sufficient collateral is pledged by these participants to secure these advances, the Bank will provide overnight liquidity and credit the settlement accounts of these participants with the value of their respective advance. The Bank will then debit these same funds from these participants' settlement accounts and use them to credit the settlement accounts of participants with a positive final net position by the amount of their respective positions. It should be noted that LVTS settlement <u>does not</u> entail any further transfers of funds through the system. It is conducted wholly on the books of the Bank of Canada."

— Arjani & McVanel

settlement; s. 53(1)

After the end of the interparticipant payment message exchange period set out in section 8, the Bank of Canada shall make a single credit entry or, to the extent that funds are available in a participant's settlement account, make a single debit entry to the settlement account of each participant to settle each participant's multilateral net position.

Multilateral Net Position = MNT1P + MNT2P

"General payment exchange in the LVTS ends at 18:00 hours E.T. each day and participants' net positions resulting from daily payment exchange are confirmed at this time. A participant's net position is obtained by adding together its T1 and T2 multilateral positions. Some participants will hold net credit (positive) positions, others will hold net debit (negative) positions, and some participants' positions may be zero, following general payment exchange."

— Arjani & McVanel

Net Debit Position

"If a participant has a net debit position at 18:00 hours E.T. and this position is not brought to zero through overnight interbank lending prior to LVTS settlement, the participant must apply to the Bank of Canada to obtain a fully secured overnight liquidity advance through the Bank's Standing Liquidity Facility (SLF). The interest rate charged for overnight SLF advances is the Bank Rate, which is the upper-bound of the Bank's 50-basis-point target band for the overnight interest rate."

— Arjani & McVanel

provision of liquidity (forced loan); s. 54

If insufficient funds are available in the settlement account of a participant to settle that participant's negative multilateral net position, that participant shall, immediately on demand by the Bank of Canada or within such time period as may be specified by the Bank of Canada, apply to the Bank of Canada for a discretionary advance to enable settlement of the participant's negative multilateral net position.

Repayment of Overnight Loan

"Repayment of an overnight advance from the Bank of Canada is due before 18:00 hours E.T. on the following business day via an LVTS payment from the borrower to the Bank. Once repayment is completed, the Bank of Canada will release collateral used to secure the advance back to the participant."

—Arjani & McVanel

Net Credit Position

"Those participants with positive net positions at the time of LVTS settlement must leave these funds with the Bank overnight, and are paid a rate of interest by the Bank equal to the lower-bound of the 50-basis point band. Overnight advances granted to participants by the Bank on day T are required to be repaid, with interest, to the Bank by 18:00 hours E.T. on day T+1. The Bank releases balances to those participants incurring a positive net position on day T through the LVTS at the beginning of general payment exchange on day T+1."

— Arjani & McVanel

final & irrevocable; s. 55

Settlement on the books of the Bank of Canada is final and irrevocable.

Default Procedures

Intraday Default

"The Superintendent of Financial Institutions has powers under federal financial institutions legislation such as the *Bank Act* to take control of the assets of a bank for 16 days where any one of seven statutory indicators of non-viability is evidenced."

—Crawford, *Payment, Clearing and Settlement in Canada*

Default at Settlement

"A participant is declared to be in default in the LVTS if it fails, for any reason whatsoever, to secure a discretionary (SLF) advance from the Bank of Canada to enable it to settle its final LVTS net debit position. In this case, the Bank will act by seizing the necessary collateral value apportioned by the defaulting participant and crediting its settlement account ..."

—Arjani & McVanel

ASO; s. 1

additional settlement obligation or ***ASO*** means, for each participant, that participant's obligation, pursuant to section 58, to advance funds, in the amount calculated in accordance with sections 26 to 29, to ensure settlement in the event that another participant is in default as defined in section 56.

Additional Settlement Obligation (ASO)

"The ASO of each participant is the amount that the participant may be required to pay under the LVTS By-law and Rules in the event of failure by another participant to settle for its multilateral net debit obligation on any given day. The formula for calculating each surviving participant's ASO is set out in s. 27 of the By-law. Except for the fact that the actual ASO of a participant cannot exceed its maximum ASO, the value of the actual ASO cannot be known until after a participant has defaulted. This is because it is not until then that the amount of the default to be covered can be determined and factored in to the calculation."

— Crawford, *Payment, Clearing and Settlement in Canada*

Proportionality

"However, the principles to be applied are clear. The ASO of each surviving participant is the same proportion of the total amount in default that the bilateral credit limit, which was established for the defaulter by that surviving participant on that day, is the total of the bilateral credit limits established by all surviving participants for the defaulter on that day."

—Crawford, *Payment, Clearing and Settlement in Canada*

Bank of Canada "Guarantee"

Section 60 does not use words of guarantee, but rather words connoting that Bank of Canada bears a direct, primary and non-discretionary obligation which is triggered only after all the default procedures set out in ss. 56-59 have been followed without final settlement being achieved.

residual guarantee; s. 60(2)

Despite any maximum ASO that the Bank of Canada may have, if, after such procedures on default have been followed, the negative multilateral net positions of all participants that are in default have not been settled, the Bank of Canada shall advance funds to the defaulting participants to enable settlement of the negative multilateral net positions of those participants and the termination of the LVTS cycle.
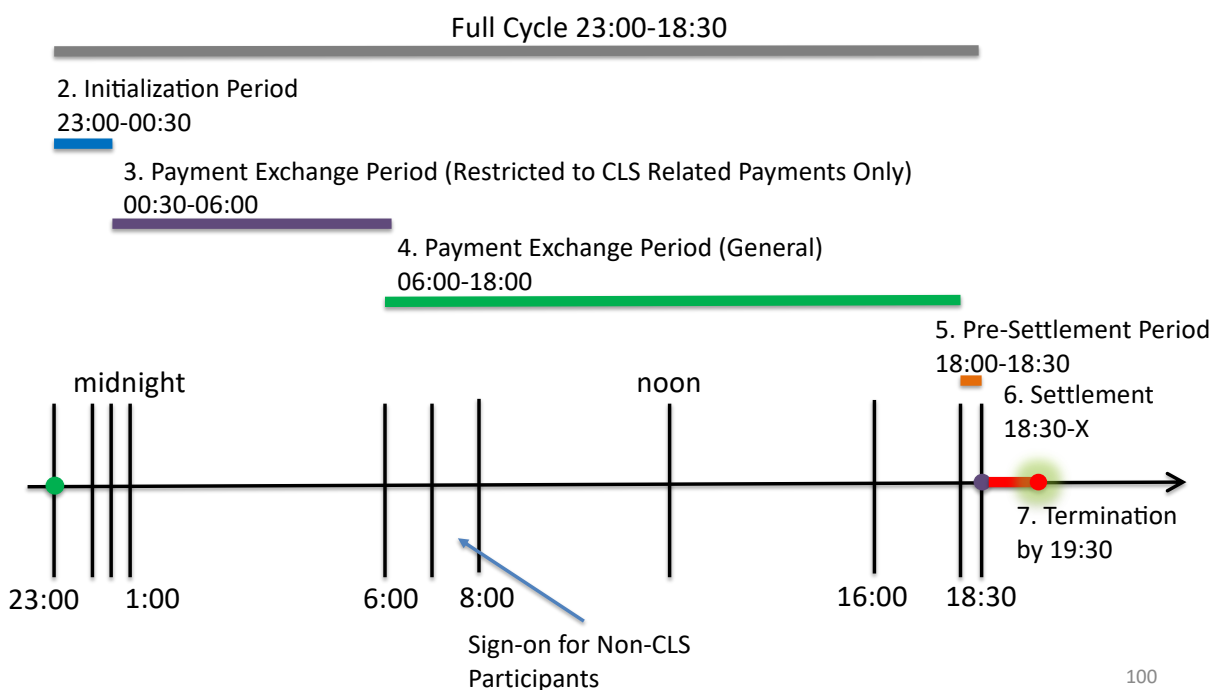
obligation to reimburse; s. 61

A defaulting participant is obligated to reimburse the Bank of Canada the amount that is advanced to it by the Bank of Canada in accordance with section 60 and that amount constitutes a debt of the defaulting participant that survives irrespective of whether the defaulting participant has its status as a participant suspended or revoked.

7. Termination: by 7:30pm

Full Cycle 23:00-18:30

2. Initialization Period
23:00-00:30

3. Payment Exchange Period (Restricted to CLS Related Payments Only)
00:30-06:00

4. Payment Exchange Period (General)
06:00-18:00

5. Pre-Settlement Period
18:00-18:30

6. Settlement
18:30-X

midnight   noon

7. Termination
by 19:30

23:00   1:00   6:00   8:00   16:00   18:30

Sign-on for Non-CLS
Participants

termination; s. 10

The LVTS cycle is terminated on completion of the settlement of all participants' multilateral net positions, and the President shall notify all participants when termination of the LVTS cycle has occurred.

2019 Statistics

The daily average total processed through the LVTS in 2019 was over $189 Billion.

The accumulated annual total was approximately $47.7 Trillion.

- ~100,000 Tranche 1 payments totaling $12.1 Trillion
- ~1,000,000 Tranche 2 payments totaling $35.6 Trillion

Thanks for reading. CB

Read more of my work at

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