FINL CHAIN ARCHITECTURE

HACKERS R&D DEVELOPER

finlchain

Agenda & Contents

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Version	v0.0.1
Participants	

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Abbreviations and acronyms

IS	Index Server
ISA	Index Server Agent
ISAg	Index Server Agent Global
DGOS	
DN	Database Node
DBN	Database Backup Node
FBGN	Full Block Gateway Node
SCA	Smart Contract Agent
NN	Network Node
CN	Consensus Node (could be Master Node)
MN	Master Node
BE	Block Explorer
CLI	Command Line Interface Application
BGI	Block Generation Interval
SC	Smart Contract
BGT	Block Generation Time
BCT	Block Confirm Time
PBH	Pervious Block Hash
TX	Transaction

FB	Full Block
RTT	Round Trip Time
DPoR	Delegated Proof of Reputation
PoW	Proof of Work
PoS	Proof of Stake
DPoS	Delegated Proof of Stake

What is Block Chain?

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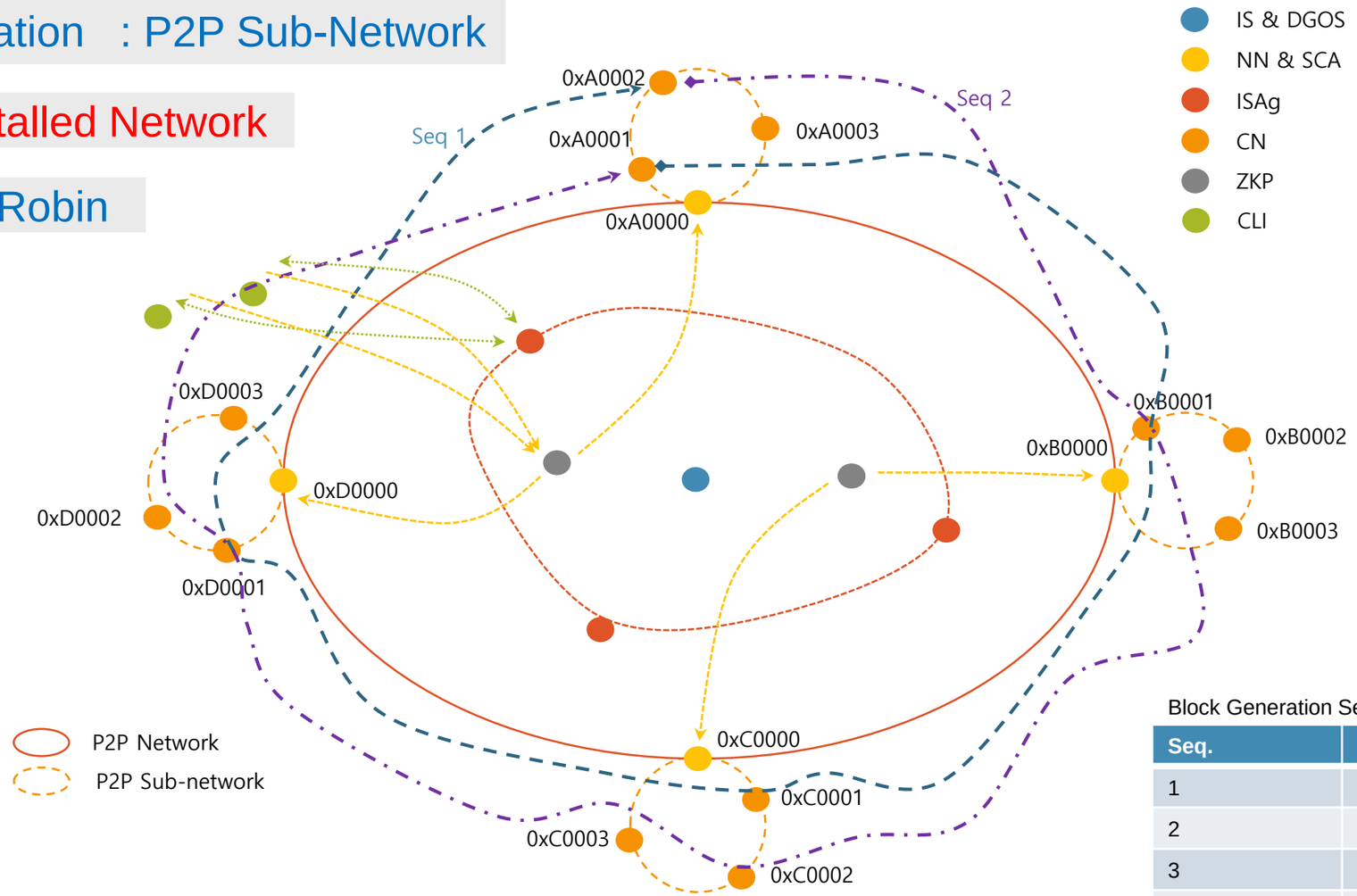
- Block Generation (Information Storage)
- Block Storage
- Block Sharing
- Block Search

Overall Acrchtecture – Network Archtecture

* Globalization : P2P Network
* Localization : P2P Sub-Network

* Pre Installed Network

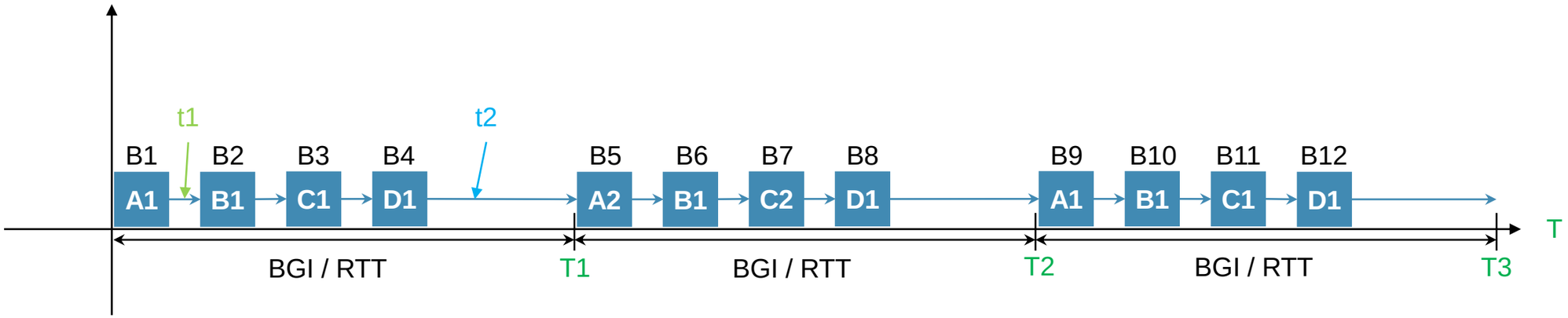
* Round Robin



Block Generation Sequence (Round Robin)

Seq.	NET Seq.	SubNET Seq.
1	A	A0001, A0002
2	B	B0001
3	C	C0001, C0002
4	D	D0001

Overall Archtecture – Block Generation Sequence

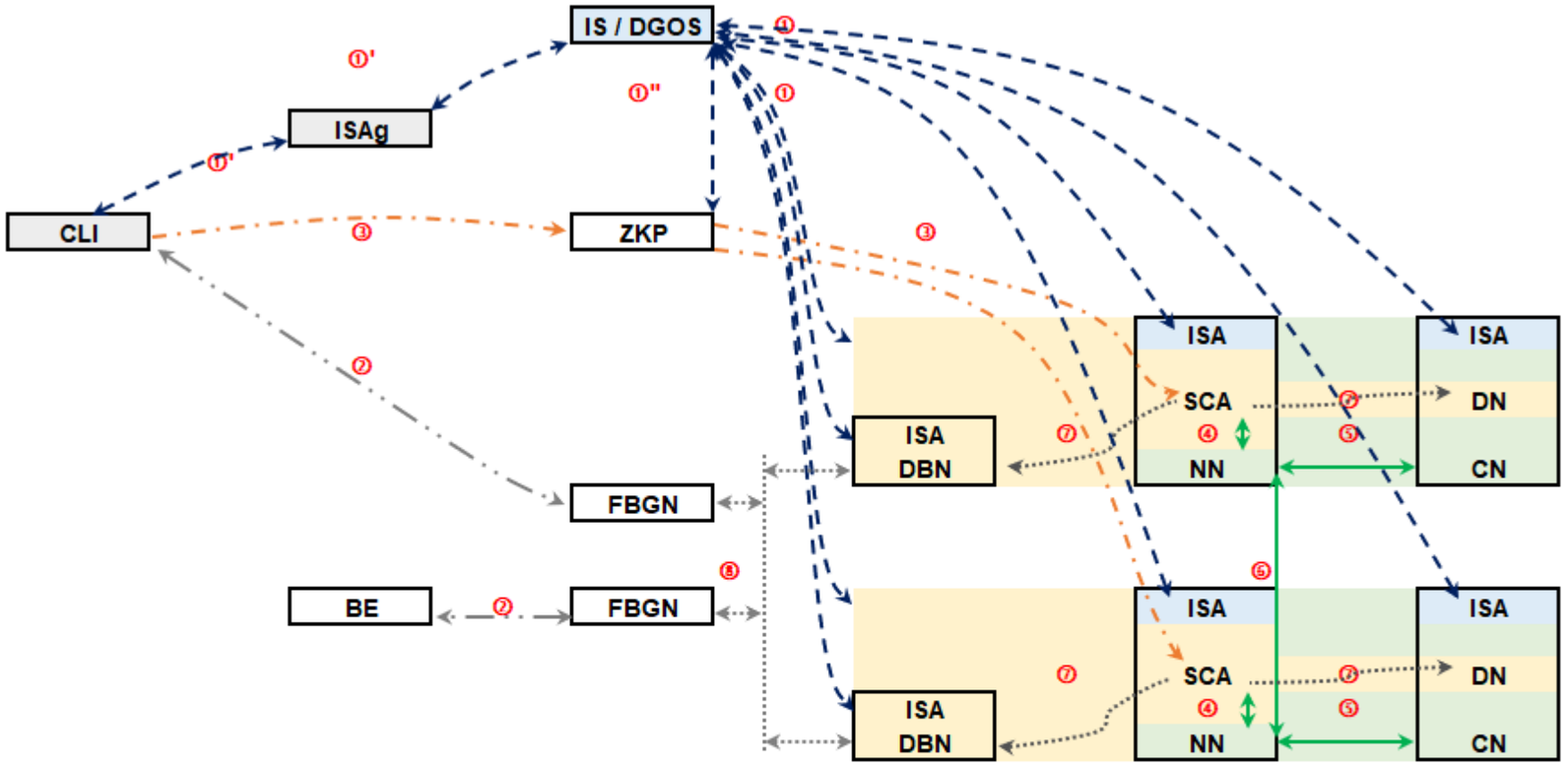


BGI / RTT	1 sec, 2 sec, 5 sec ... BGI > ((t1 * (Number of SubNET – 1)) + t2)
t1	Very Little Time (Tens of msecs ~ Hundreds of msecs)

Overall Archtecture – 5W1H

	WHO	WHEN	WHERE	WHAT	HOW	WHY
BITCOIN	Everyone	Every 10 mins	Everywhere	Block	PoW	Mining
ETHEREUM	Everyone	Every 12 secs	Everywhare	Block	PoW, PoS	Mining
EOS	21 BP	Every 500 ms or Higher	BP's home	Block	DPoS	Rewards
FINL	CN of Sub-networks	Every 1 secs or Higher	Sub-networks	Block	DPoR	Rewards

Overall Acrchtecture – Packet Flow



①	IS < - > ISA	Control Packets	Global IP
①'	IS < - > ISAg < - > CLI		Global IP
①"	IS < - > ZKP	Control Packets (Topic List)	Global IP
②	CLI / BE < - > FBGN	Look up DB	Global IP
③	CLI - > ZKP - > SCA	Data Packets (Contract)	Global IP
④	SCA <-> NN	Data Packets (Transaction)	Local Redis
⑤	NN < - > CN	Sub Network (MN)	Local IP 1
⑥	NN < - > NN	Main Network (Block)	Global IP
⑦	SCA - > DN / DBN	Database	Local IP 2
⑧	DBNs < - > FBGNs	Database Gateway	Global IP

Overall Archtecture – Contract

	Field Name	Comment				
Contract	revision (4)	From 0 to increased by ONE				
	prev_db_key (8)	Previous Revision DB Key ID				
	create_tm (8)	UTC milliseconds				
	fintech (1)	Financial Transaction				
	from (33)	Public Key				
	balance (8)					
	note_privacy (1)	0 : Private / 1 : Public				
	note (Blob)	To (33)	Fee (4)	Kind (4)	Content (Blob)	Date (4) (UTC sec)
		To (33)	Fee (4)	Kind (4)	Content (Blob)	Date (4) (UTC sec)
		To (33)	Fee (4)	Kind (4)	Content (Blob)	Date (4) (UTC sec)
		To (33)	Fee (4)	Kind (4)	Content (Blob)	Date (4) (UTC sec)
	signature (64)	From Revision to Note				

Kind
Security Coin
Utility Coin
Registration

Overall Archtecture – Contract : Note Description

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Fintech	From	Note					
		Name	To	Kind	Len	Contents	Date
		Security Coin		Hex Dec	Bytes		
0x1	All	finl	All		8 Array	Amount DB Key ID Lists	UTC Sec
		Utility Coin					
0x1	All		All		8 Array	Amount DB Key ID Lists	UTC Sec
		Registration					
0x0	All	Add : User	All 0's		32 33	ID Public Key	UTC Sec
0x0	All	Change : User ID	All 0's		32 33	ID Public Key	UTC Sec
0x0	All	Change : User PubKey	All 0's		32 33	ID Public Key	UTC Sec
0x0	All	Login : User	All 0's		4	IP	UTC Sec
0x0	All	Logout : User	All 0's		4	IP	UTC Sec
0x0	All	Logout : User (Timeout)	All 0's		32 33	ID Public Key	UTC Sec
0x0	IS	Add : HW	All 0's		32 33 4 8 Object	ID Public Key IP P2P Address HW SN	UTC Sec
0x0	IS	Changed : HW ID	All 0's		32 33 Object	ID Public Key HW SN	UTC Sec
0x0	IS	Changed : HW PubKey	All 0's		32 33 Object	ID Public Key HW SN	UTC Sec
0x0	IS	Changed : HW SN	All 0's		32 33 Object	ID Public Key HW SN	UTC Sec
0x0	IS	rr_net.json	All 0's		Object	rr_net.json	UTC Sec
		rr_subnet.json	Node		Object	rr_subnet.json	UTC Sec
		node.json	Node		Object	node.json	UTC Sec
0x0	IS	Add : Kafka	All 0's		Object	IDX Broker List Topic List	UTC Sec

Overall Archtecture – DB

DB - sc

DB	Name	Field	Type
sc	info	subnet_id (2)	SMALLINT(5) UNSIGNED
		db_key (8)	BIGINT UNSIGNED
		block_num (8)	BIGINT UNSIGNED
		bgt (8)	BIGINT UNSIGNED
		bct (8)	BIGINT UNSIGNED
		hash (32)	TEXT
sc	contents	subnet_id (2)	SMALLINT(5) UNSIGNED
		db_key (8)	BIGINT UNSIGNED
		contract (Blob)	TEXT
sc	contracts	index	
		form_pk	
		revision	
		db_key	
		block_num	
		to_pk	
		kind	
		amount	
		balance	

DB - block

DB	Name	Field	Type
block	tx	subnet_id (2)	SMALLINT(5) UNSIGNED
		block_num (8)	BIGINT UNSIGNED
		db_key (8)	BIGINT UNSIGNED
		hash (32)	TEXT
block	info	subnet_id (2)	SMALLINT(5) UNSIGNED
		block_num (8)	BIGINT UNSIGNED
		status (1)	TINYINT(3) UNSIGNED
		bct (8)	BIGINT UNSIGNED
block	contents	subnet_id (2)	SMALLINT(5) UNSIGNED
		block_num (8)	BIGINT UNSIGNED
		sig_type (1)	TINYINT(3) UNSIGNED
		p2p_addr (8)	BIGINT UNSIGNED
		bgt (8)	BIGINT UNSIGNED
		pbh (32)	TEXT
		tx_count (4)	INT(11) UNSIGNED
		hash (32)	TEXT
		signature (64)	TEXT

P2P Network – P2P Address : Policy

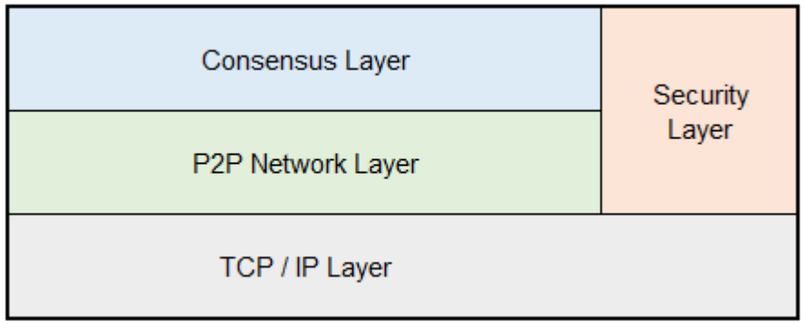
Total Length	64 bits	0x	FFFF	FFFF	FFFF	FFFF
GPS Information	32 bits	0x	FFFF	FFFF	0000	0000
Unique Information	16 bits	0x	0000	0000	FFFF	0000
Chain	1 bit	0x			8000	
Continents	3 bits	0x			7000	
Countries	4 bits	0x			0F00	
Hub	4 bits	0x			00FC	
Subnet	4 bits	0x			0003	
Subnet Address	16 bits	0x				FFFF

P2P Network – P2P Address : GPS Information

- GPS Information
  - MSB 32 Bits of P2P Address
  - Latitude : MSB 16 Bits of GPS Information
  - Loongitude : LSB 16 Bits of GPS Information
  - E.g.) If Latitude = 37.488593, Longitude = 127.051379
    - Decimal Number = 37, 48, 127, 05
    - Hexadecimal Number = 0x25, 0x30, 0x7F, 0x05
    - GPS Information = 0x25307F05
  - Error Range
    - MAX : < 1.44km * 2 = 2.88km

P2P Network – Layer Archtecture

Layer Archtecture



P2P Header Description

8 Bytes	8 Bytes	8 Bytes	4 Bytes	2 Bytes	2 Bytes	Veriable	4 Bytes
Dest Addr	Src Addr	Timestamp	Info	Seq. Num.	Total Length	TLV	CRC32

Consensus Header Description

40 Bytes	2 Bytes			2 Bytes		Veriable
	4 Bits	4 Bits	8 Bits	4 Bits	12 Bits	
P2P Header	Version	Type	Cmd	Signature Algo.	Length	Cmd / Data

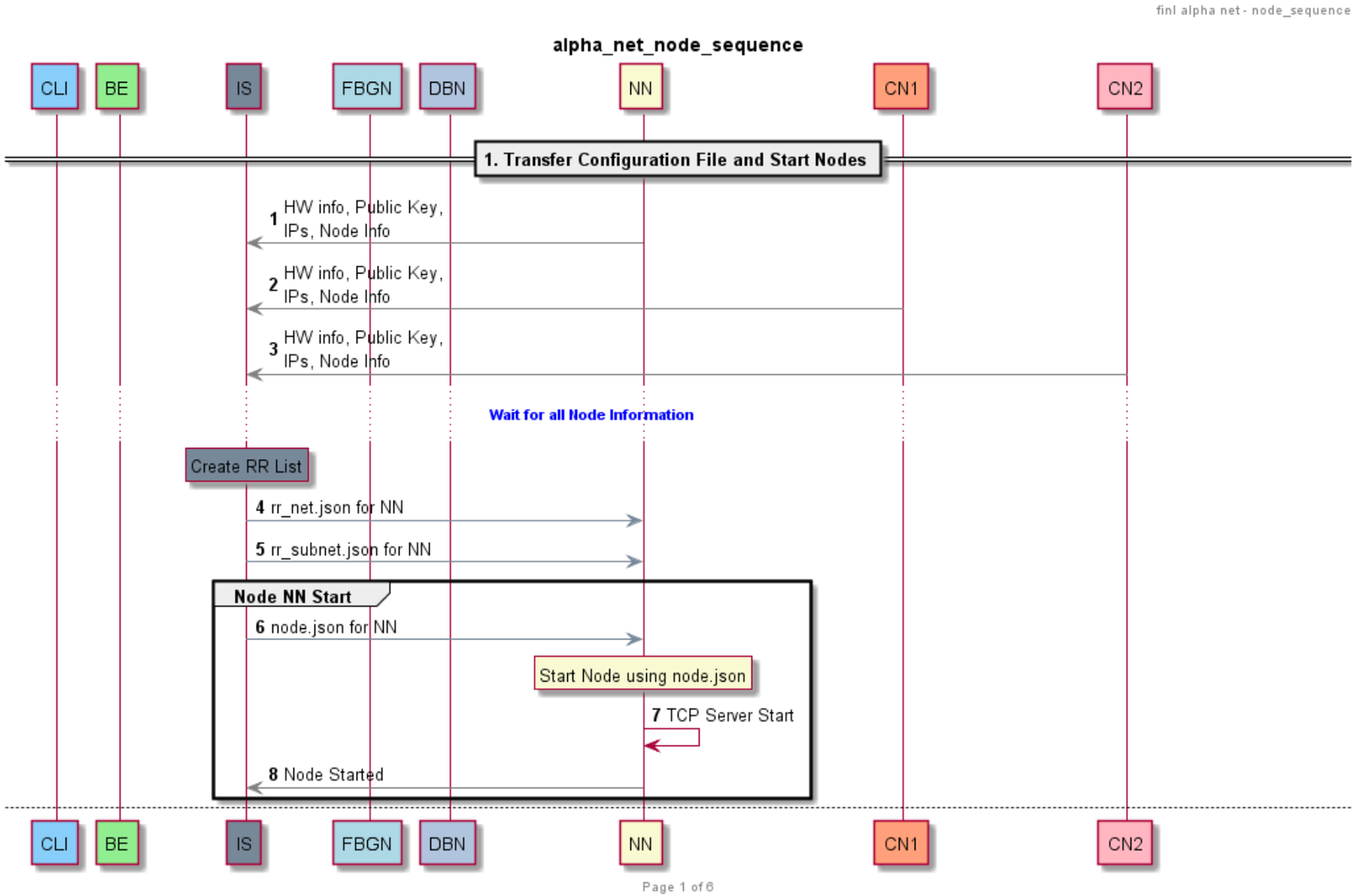
P2P Network – P2P Frame Description

- P2P Join Request
- P2P Join Response
- P2P Leave Request
- P2P Leave Notification
- P2P Public Key Notification

P2P Network – Consensus Frame Description

- Consensus Block Generation Request
- Consensus Block Notification
- Consensus Transaction Stop Request
- Consensus Transaction Stop Response

Node Sequence



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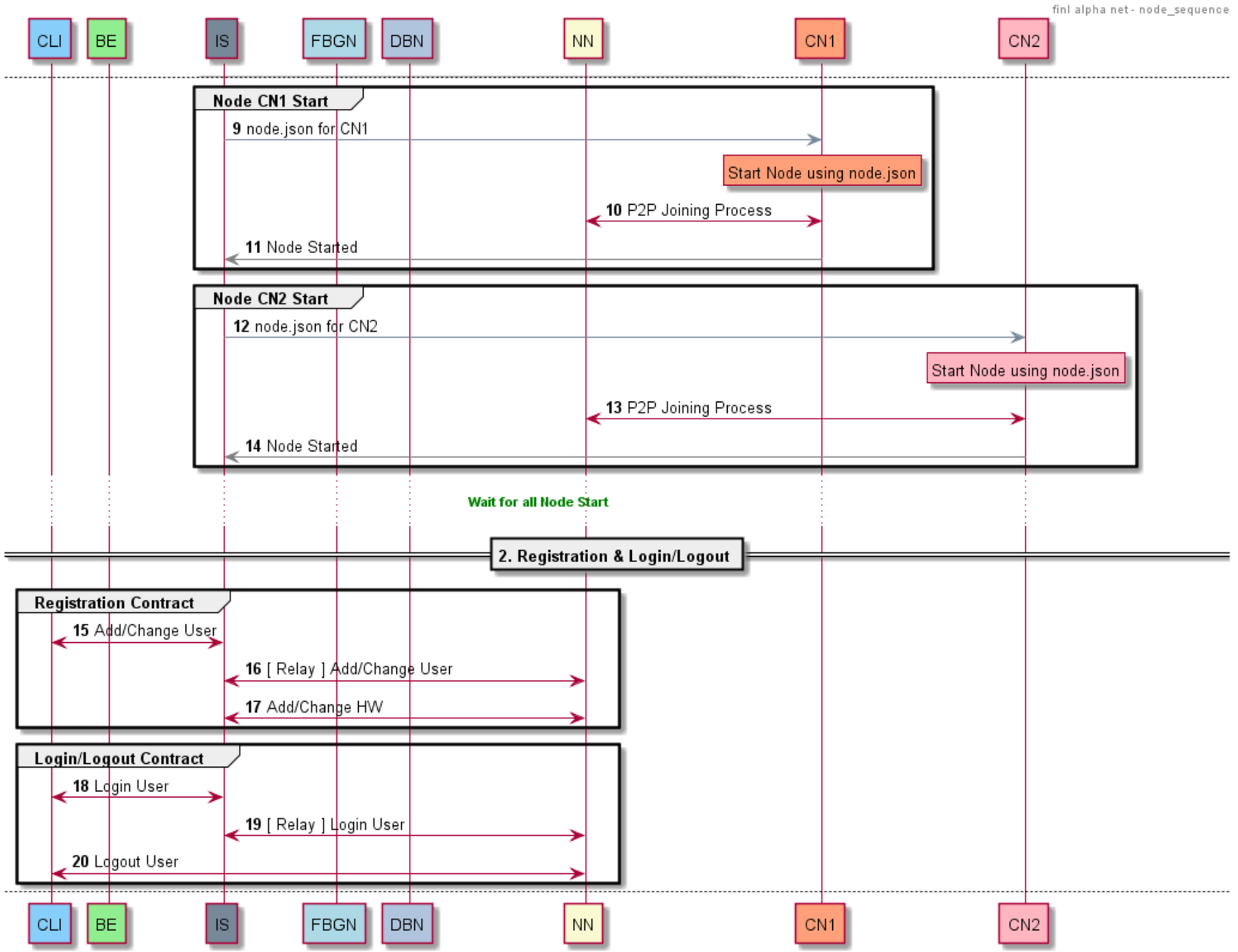

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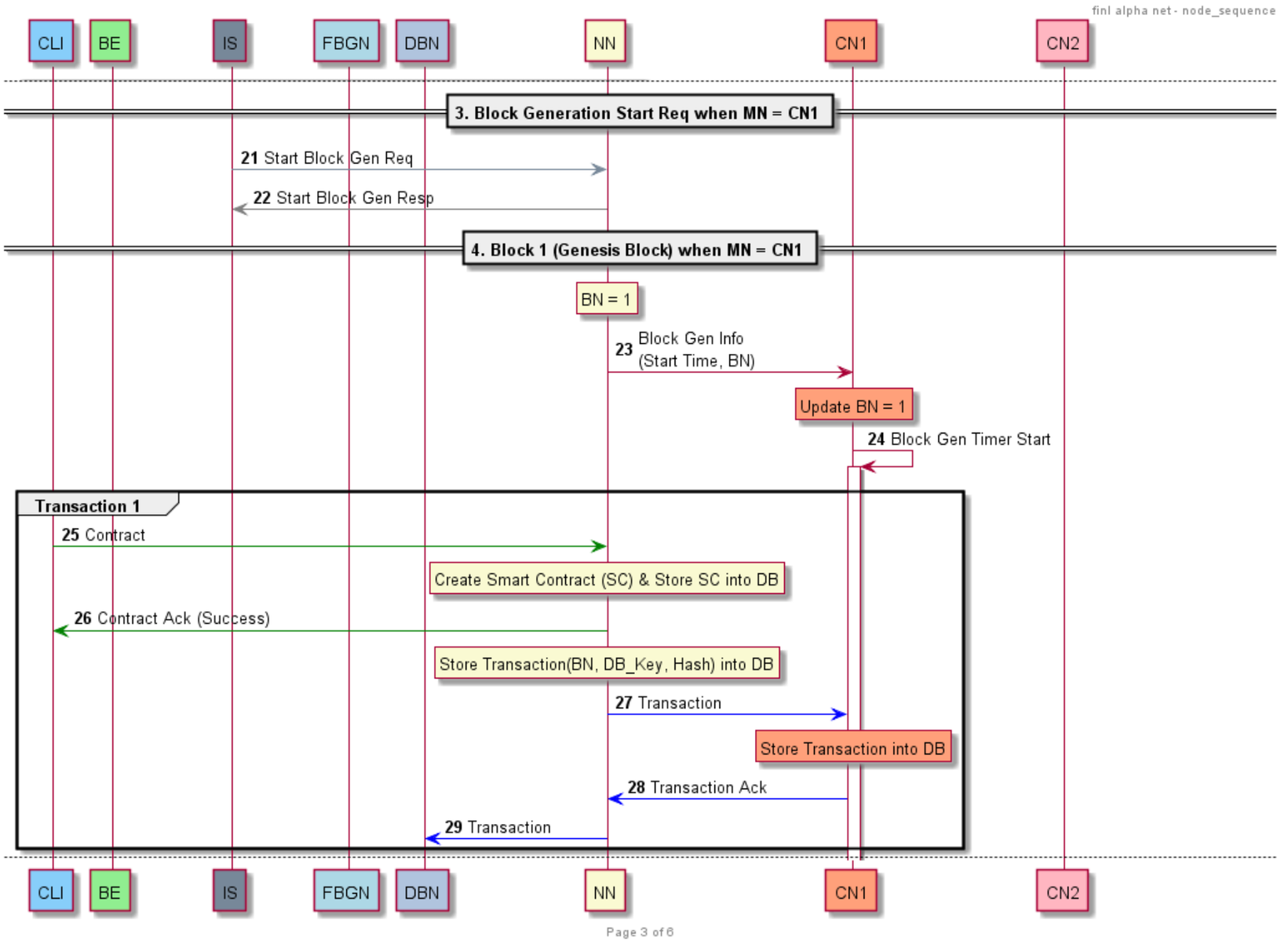

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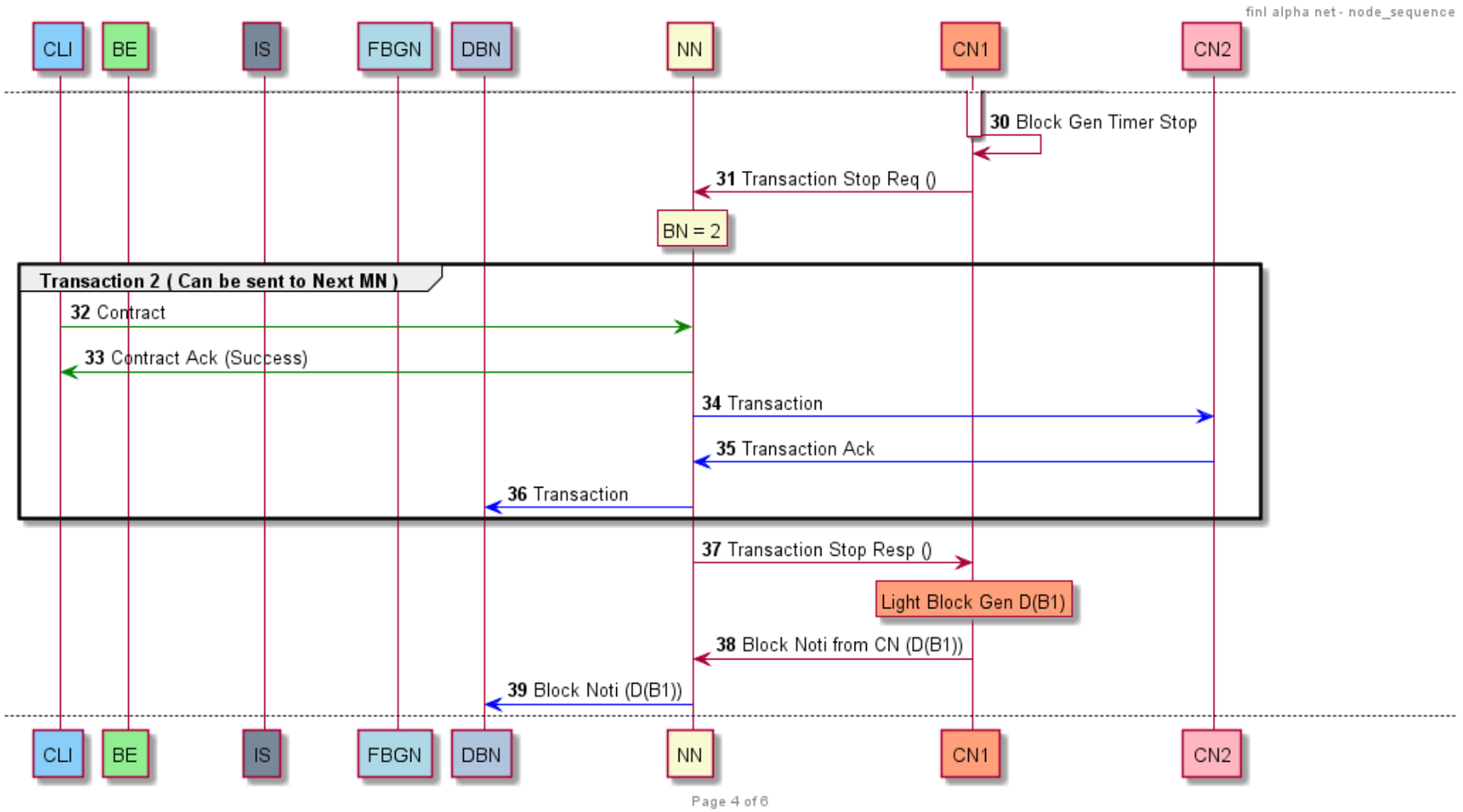

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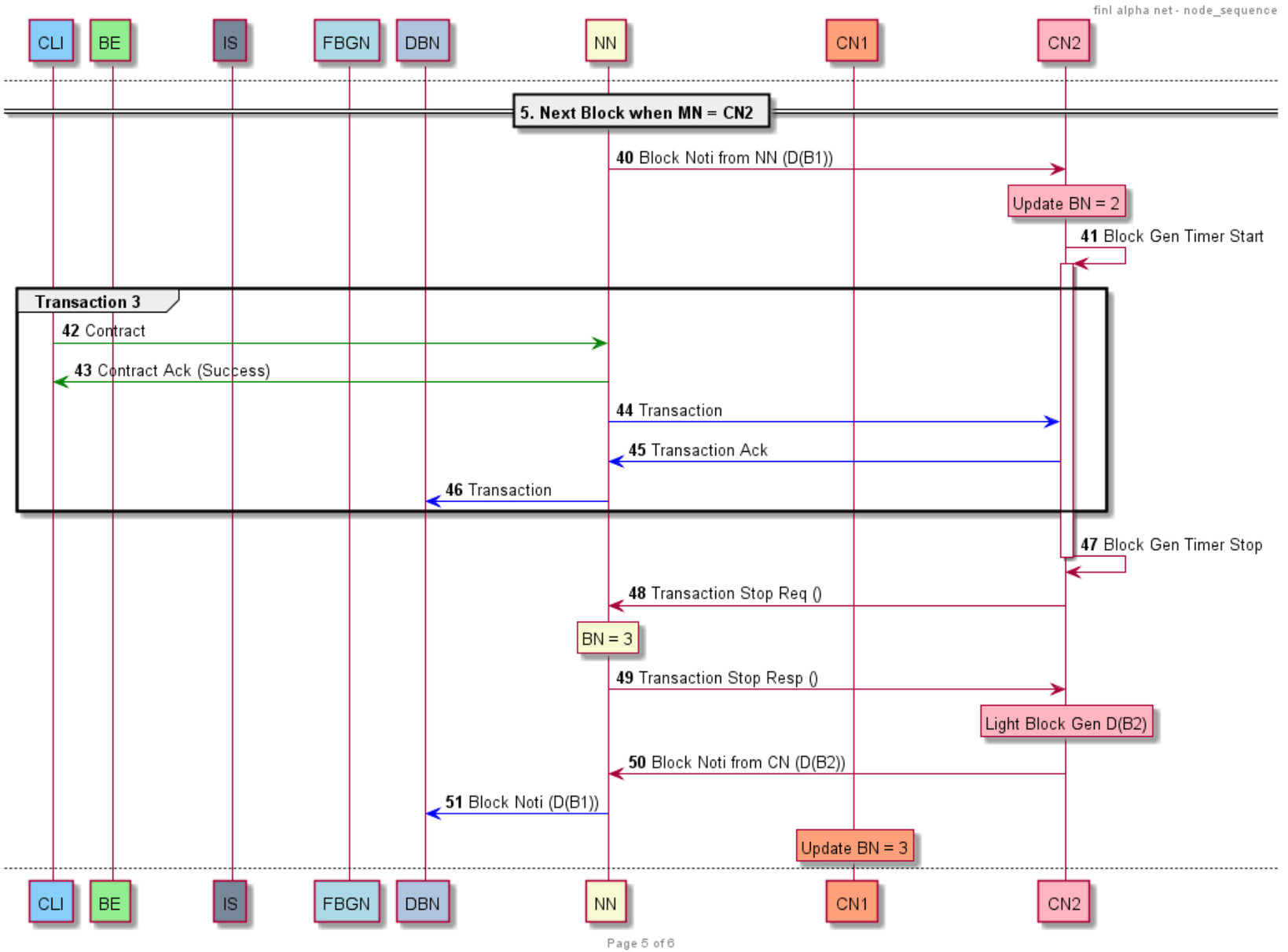

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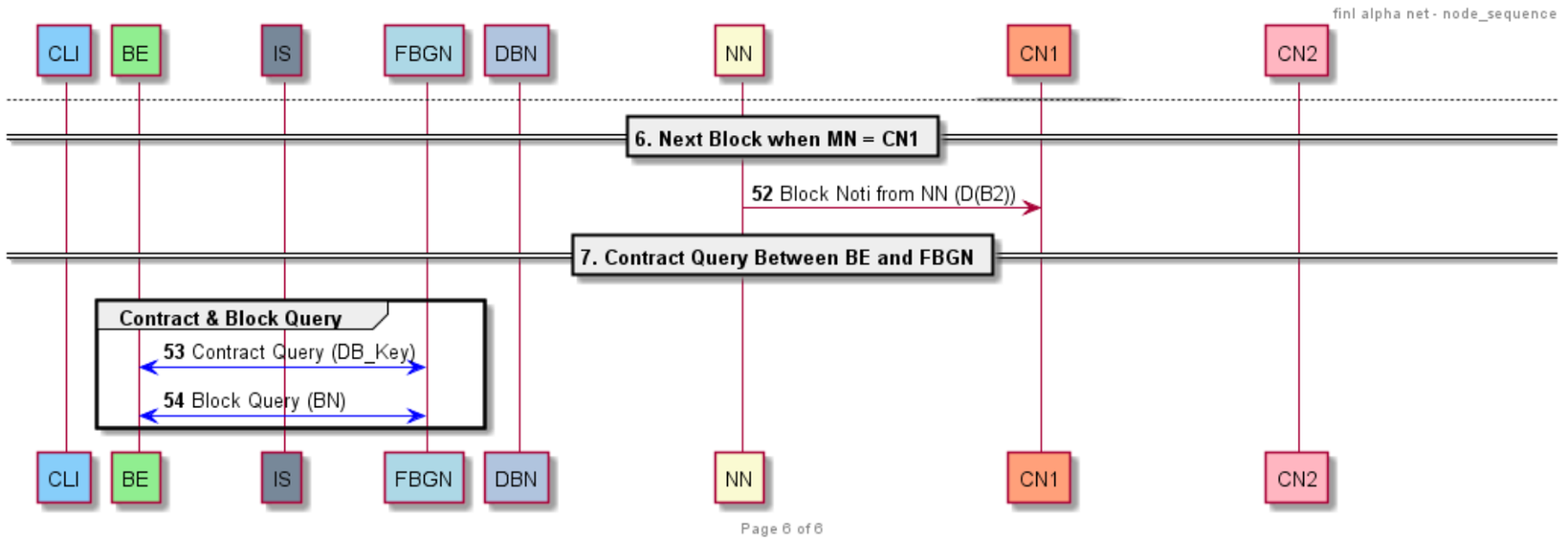

Thank You

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