Detailed Constitution Parameters

- source

22 Dec 2024

 this doc will not be updated beyond the first governance change to thresholds

```
Symbol and Explanation
  - (y) The Guardrail Script can be used to enforce the Guardrail
  - (x) The Guardrail Script cannot be used to enforce the Guardrail
  - (~ - reason) The Guardrail Script cannot be used to enforce the Guardrail for the reason given, but future le
```

2. Guardrails and Guidelines on Protocol Parameter Update Actions

 Note that users may scroll code blocks left to right

```
Below are Guardrails and guidelines for changing updatable protocol parameter settings via the protocol parameter
update governance action such that the Cardano Blockchain is never in an unrecoverable state as a result of such
```

```
Note that, to avoid ambiguity, this Appendix uses the parameter name that is used in protocol parameter update go
actions rather than any other convention.
```

Param Name	Parameter/Guardrail	Value
PARAM	PARAM-01 (y)	Any protocol parameter that is not explicitly named in this document must not be changed by a Parameter update governance action
	PARAM-02a (y)	Where a protocol parameter is explicitly listed in this document but no checkable Guardrails are specified, the Guardrails Script must not impose any constraints on changes to the parameter. Checkable Guardrails are shown by a (y)

2.1. Critical Protocol Parameters

```
The below protocol parameters are critical from a security point of view.
```

Parameters That Are CRITICAL TO THE OPERATION OF THE BLOCKCHAIN

Param Name	Parameter/Guardrail
maximum block body size	maxBlockBodySize
maximum transaction size	maxTxSize

Param Name	Parameter/Guardrail
maximum block header size	`maxBlockHeaderSize`
maximum size of a serialized asset value	`maxValueSize`
maximum script execution/memory units in a single block	`maxBlockExecutionUnits[steps/memory]`
minimum fee coefficient	`txFeePerByte`
minimum fee constant	`txFeeFixed`
minimum fee per byte for reference scripts	`minFeeRefScriptCoinsPerByte`
minimum lovelace deposit per byte of serialized UTxO	`utxoCostPerByte`
governance action deposit	`govDeposit`

`Parameter: PARAM`

Param Name	Parameter/Guardrail	Value
`PARAM`	PARAM-03a (y)	Critical protocol parameters require an SPO vote in addition to a DRep vote: SPOs must say "yes" with a collective support of more than 50% of all active block production stake. This is enforced by the Guardrails on the stake pool voting threshold.
	PARAM-04a (x)	At least 3 months should normally pass between the publication of an off-chain proposal to change a critical protocol parameter and the submission of the corresponding on-chain governance action. This Guardrail may be relaxed in the event of a Severity 1 or Severity 2 network issue following careful technical discussion and evaluation.

Parameters That Are CRITICAL TO THE GOVERNANCE SYSTEM

Param Name	Parameter/Guardrail
delegation key lovelace deposit	`stakeAddressDeposit`
pool registration lovelace deposit	`stakePoolDeposit`
minimum fixed rewards cut for pools	`minPoolCost`
DRep deposit amount	`dRepDeposit`
minimal Constitutional Committee size	`committeeMinSize`

Param Name	Parameter/Guardrail
maximum term length (in epochs) for the Constitutional Committee members	`committeeMaxTermLength`

`Parameter: PARAM`

Param Name	Parameter/Guardrail	Value
`PARAM`	PARAM-05a (y)	DReps must vote "yes" with a collective support of more than 50% of all active voting stake. This is enforced by the Guardrails on the DRep voting thresholds.
	PARAM-06a (x)	At least 3 months should normally pass between the publication of an off-chain proposal to change a parameter that is critical to the governance system and the submission of the corresponding on-chain governance action. This Guardrail may be relaxed in the event of a Severity 1 or Severity 2 network issue following careful technical discussion and evaluation.

2.2 Economic Parameters

Transaction Fee Per Byte & Fixed Transaction Fee

`Parameter #1: txFeePerByte`
`Parameter #2: txFeeFixed`

`Defines the cost for basic transactions in lovelace:`
- `fee(tx) = txFeeFixed + txFeePerByte x nBytes(tx)`

Param Name	Parameter/Guardrail	Value
`txFeePerByte`	TFPB-01 (y)	must not be lower than 30 (0.000030 ada)
	TFPB-02 (y)	must not exceed 1,000 (0.001 ada)
	TFPB-03 (y)	must not be negative
`txFeeFixed`	TFF-01 (y)	must not be lower than 100,000 (0.1 ada)
	TFF-02 (y)	must not exceed 10,000,000 (10 ada)
	TFF-03 (y)	must not be negative
`txFee – General`	TFGEN-01 (x - "should")	To maintain a consistent level of protection agains denial-of-service attacks, txFeeFixed and txFeeFixed should be adjusted whenever Plutus Execution prices are adjusted (executionUnitPrices[steps/memory])

Param Name	Parameter/Guardrail	Value
	TFGEN-02 (x - unquantifiable)	Any changes to txFeeFixed or txFeeFixed must consider the implications of reducing the cost of a denial-of-service attack or increasing the maximum transaction fee so that it becomes impossible to construct a transaction.

UTxO cost per byte
Parameter: utxoCostPerByte

Defines the deposit (in lovelace) that is charged for each byte of storage tha is held in a UTxO. This deposit is
- Sets a minimum threshold on ada that is held within a single UTxO
- Provides protection against low-cost denial of service attack on UTxO storage. DoS protection decreases in li
- Helps reduce long-term storage costs for node users by providing an incentive to return UTxOs when no longer

Param Name	Parameter/Guardrail	Value
utxoCostPerByte	UCPB-01 (y)	must not be lower than 3,000 (0.003 ada)
	UCPB-02 (y)	must not exceed 6,500 (0.0065 ada)
	UCPB-03 (y)	must not be zero
	UCPB-04 (y)	must not be negative
	UCPB-05a (x - "should")	Changes should account for 1. The acceptable cost of attack 2. The acceptable time for an attack 3. The acceptable memory configuration for full node users 4. The sizes of UTxOs and 5. The current total node memory usage

Stake Address Deposit
Parameter: stakeAddressDeposit

Ensures that stake addresses are retired when no longer needed
- Helps reduce long-term storage costs
- Helps limit CPU and memory costs in the ledger

The rationale for the deposit is to incentivize that scarce memory resources are returned when they are no longer
Reducing the number of active stake addresses also reduces processing and memory costs at the epoch boundary wher

Param Name	Parameter/Guardrail	Value
stakeAddressDeposit	SAD-01 (y)	must not be lower than 1,000,000 (1 ada
	SAD-02 (y)	must not exceed 5,000,000 (5 ada)
	SAD-03 (y)	must not be negative

Stake Pool Deposit
Parameter: stakePoolDeposit

Ensures that stake pools are retired by the stake pool operator when no longer needed by them
 • Helps reduce long-term storage costs

The rationale for the deposit is to incentivize that scarce memory resources are returned when they are no longer
Rewards and stake snapshot calculations are also impacted by the number of active stake pools.

Param Name	Parameter/Guardrail	Value
stakePoolDeposit	SPD-01 (y)	must not be lower than 250,000,000 (250 ada)
	SPD-02 (y)	must not exceed 500,000,000 (500 ada)
	SPD-03 (y)	must not be negative

Minimum Pool Cost
Parameter: minPoolCost

Part of the rewards mechanism
 • The minimum pool cost is transferred to the pool rewards address before any delegator rewards are paid

Param Name	Parameter/Guardrail	Value
minPoolCost	MPC-01 (y)	must not exceed 500,000,000 (500 ada)
	MPC-02 (y)	must not be negative
	MPC-03 (x - "should")	should be set in line with the economic cost for operating a pool

Treasury Cut
Parameter: treasuryCut

Part of the rewards mechanism
• The treasury cut portion of the monetary expansion is transferred to the treasury before any pool rewards are
• Can be set in the range 0.0–1.0 (0%–100%)

Param Name	Parameter/Guardrail	Value
treasuryCut	TC-01 (y)	must not be lower than 0.1 (10%)
	TC-02 (y)	must not exceed 0.3 (30%)
	TC-03 (y)	must not be negative
	TC-04 (y)	must not exceed 1.0 (100%)
	TC-05 (~ - no access to change history)	must not be changed more than once in any 36 epoch period (approximately 6 months)

Monetary Expansion

Parameter: monetaryExpansion

Part of the rewards mechanis
• The monetary expansion controls the amount of reserves that is used for rewards each epoch

Governs the long-term sustainability of the Cardano Blockchain
• The reserves are gradually depleted until no rewards are supplied

Param Name	Parameter/Guardrail	Value
monetaryExpansion	ME-01 (y)	must not exceed 0.005
	ME-02 (y)	must not be lower than 0.001
	ME-03 (y)	must not be negative
	ME-04 (x - "should")	should not be varied by more than +/- 10% in any 73-epoch period (approximately 12 months)
	ME-05 (x - "should")	should not be changed more than once in any 36-epoch period (approximately 6 months)

Plutus Script Execution Prices

Parameter #1: executionUnitPrices[priceSteps

Parameter #2: executionUnitPrices[priceMemory]

• Define the fees for executing Plutus scripts

- Gives an economic return for Plutus script execution
- Provides security against low-cost DoS attacks

Param Name	Parameter/Guardrail	Value
`executionUnitPrices[priceSteps]`	EIUP-PS-01 (y)	must not exceed 2,000 / 10,000,000
	EIUP-PS-02 (y)	must not be lower than 500 / 10,000,000
`executionUnitPrices[priceMemory]`	EIUP-PM-01 (y)	must not exceed 2,000 / 10,000
	EIUP-PM-02 (y)	must not be lower than 400 / 10,000
`executionUnitPrices` - General	EIUP-GEN-01 (x - "similar to")	The execution prices must be set so that 1. the cost of executing a transaction with maximum CPU steps is similar to the cost of a maximum sized non-script transaction and 2. the cost of executing a transaction with maximum memory units is similar to the cost of a maximum sized non-script transaction
	EIUP-GEN-02 (x - "should")	The execution prices should be adjusted whenever transaction fees are adjusted (txFeeFixed/txFeePerByte). The goal is to ensure that the processing delay is similar for "full" transactions, regardless of their type. • This helps ensure that the requirements on block diffusion/propagation times are met.

Transaction Fee Per Byte For A Reference Script

Parameter: `minFeeRefScriptCoinsPerByte`

Defines the cost for using Plutus reference scripts in lovelace

Param Name	Parameter/Guardrail	Value
`minFeeRefScriptCoinsPerByte`	MFRS-01 (y)	must not exceed 1,000 (0.001 ada) • This ensures that transactions can be paid for
	MFRS-02 (y)	must not be negative
	MFRS-03 (x - "should")	To maintain a consistent level of protection against denial-of-service attacks, minFeeRefScriptCoinsPerByte should be adjusted whenever Plutus Execution prices are adjusted (executionUnitPrices[steps/memory]) and whenever txFeeFixed is adjusted
	MFRS-04 (x - unquantifiable)	Any changes to minFeeRefScriptCoinsPerByte must consider the implications of reducing the cost of a denial-of-service attack or increasing

Param Name	Parameter/Guardrail	Value
	the maximum transaction fee	

2.3. Network Parameters

The overall goals when managing the Cardano Blockchain network parameters are to:

Match the available Cardano Blockchain Layer 1 network capacity to current or future traffic demands, including payment transactions, layer 1 DApps, sidechain management and governance needs

Balance traffic demands for different user groups, including payment transactions, minters of sFungible/Non-Fungible Tokens, Plutus scripts, DeFi developers, Stake Pool Operators and voting transactions

Triggers For Change

Changes to network parameters may be triggered by:
- Measured changes in traffic demands over a 2-epoch period (10 days)
- Anticipated changes in traffic demands
- Cardano Community requests

Counter-indicators

Changes may need to be reversed and/or should not be enacted in the event of:
- Excessive block propagation delays
- Stake pools being unable to handle traffic volume
- Scripts being unable to complete execution

Core Metrics

All decisions on parameter changes should be informed by:
- Block propagation delay profile
- Traffic volume (block size over time)
- Script volume (size of scripts and execution units)
- Script execution cost benchmarks
- Block propagation delay/diffusion benchmarks

Detailed benchmarking results are required to confirm the effect of any changes on mainnet performance or behavior prior to enactment. The effects of different transaction mixes must be analyzed, including normal transactions, Plutus scripts, and governance actions.

Network

Parameter: NETWORK

Param Name	Parameter/Guardrail	Value
NETWORK	NETWORK-01 (x - "should")	No individual network parameter should change more than once per two epochs
	NETWORK-02 (x - "should")	Only one network parameter should be changed per epoch unless they are directly correlated, e.g., per-transaction and per-block memory unit limits

Block Size

Parameter: `maxBlockBodySize`

The maximum size of a block, in Bytes.

Param Name	Parameter/Guardrail	Value
maxBlockBodySize	MBBS-01 (y)	must not exceed 122,880 Bytes (120KB)
	MBBS-02 (y)	must not be lower than 24,576 Bytes (24KB)
	MBBS-03 (x - "exceptional circumstances")	must not be decreased, other than in exceptional circumstances where there are potential problems with security, performance, functionality or long-term sustainability
	MBBS-04 (~ - no access to existing parameter values)	must be large enough to include at least one transaction (that is, maxBlockBodySize must be at least maxTxSize)
	MBBS-05 (x - "should")	should be changed by at most 10,240 Bytes (10KB) per epoch (5 days), and preferably by 8,192 Bytes (8KB) or less per epoch
	MBBS-06 (x - "should")	The block size should not induce an additional Transmission Control Protocol (TCP) round trip. Any increase beyond this must be backed by performance analysis, simulation and benchmarking
	MBBS-07 (x - "unquantifiable")	The impact of any change to maxBlockBodySize must be confirmed by detailed benchmarking/simulation and not exceed the requirements of the block diffusion/propagation time budgets, as described below. Any increase to maxBlockBodySize must also consider future requirements for Plutus script execution (maxBlockExecutionUnits[steps]) against the total block diffusion target of 3s with 95% block propagation within 5s. The limit on maximum block size may be increased in the future if this is supported by benchmarking and monitoring results

Transaction Size

```
Parameter: maxTxSize
```

⧉

```
The maximum size of a transaction, in Bytes.
```

Param Name	Parameter/Guardrail	Value
maxTxSize	MTS-01 (y)	must not exceed 32,768 Bytes (32KB)
	MTS-02 (y)	must not be negative
	MTS-03 (~ - no access to existing parameter values)	must not be decreased
	MTS-04 (~ - no access to existing parameter values)	must not exceed maxBlockBodySize
	MTS-05 (x - "should")	should not be increased by more than 2,560 Bytes (2.5KB) in any epoch, and preferably should be increased by 2,048 Bytes (2KB) or less per epoch
	MTS-06 (x - "should")	should not exceed 1/4 of the block size

Memory Unit Limits

```
Parameter #1: maxBlockExecutionUnits[memory]
Parameter #2: maxTxExecutionUnits[memory]
```

⧉

```
The limit on the maximum number of memory units that can be used by Plutus scripts, either per-transaction or per
```

Param Name	Parameter/Guardrail	Value
maxTxExecutionUnits[memory]	MTEU-M-01 (y)	must not exceed 40,000,000 units
	MTEU-M-02 (y)	must not be negative
	MTEU-M-03 (~ - no access to existing parameter values)	must not be decreased
	MTEU-M-04 (x - "should")	should not be increased by more than 2,500,000 units in any epoch
maxBlockExecutionUnits[memory]	MBEU-M-01 (y)	must not exceed 120,000,000 units
	MBEU-M-02 (y)	must not be negative

Param Name	Parameter/Guardrail	Value
	MBEU-M-03 (x - "should")	should not be changed (increased or decreased) by more than 10,000,000 units in ANY epoch
	MBEU-M-04a (x - unquantifiable)	The impact of any change to maxBlockExecutionUnits[memory] must be confirmed by detailed benchmarking/simulation and not exceed the requirements of the block diffusion/propagation time budgets, as also impacted by maxBlockExecutionUnits[steps] and maxBlockBodySize. Any increase must also consider previously agreed future requirements for the total block size (maxBlockBodySize) measured against the total block diffusion target of 3s with 95% block propagation within 5s. Future Plutus performance improvements may allow the per-block memory limit to be increased, but must be balanced against the overall diffusion limits as specified in the previous sentence, and future requirements
MEU *not Identified*	MEU-M-01 (~ - no access to existing parameter values)	maxBlockExecutionUnits[memory] must not be less than maxTxExecutionUnits[memory]

CPU Unit Limits

```
Parameter #1:
Parameter #2:
```
⧉
```
The limit on the maximum number of CPU steps that can be used by Plutus scripts, either per transaction or per-bl
```

Param Name	Parameter/Guardrail	Value
maxTxExecutionUnits[steps]	MTEU-S-01 (y)	must not exceed 15,000,000,000 (15Bn) units
	MTEU-S-02 (y)	must not be negative
	MTEU-S-03 (~ - no access to existing parameter values)	must not be decreased
	MTEU-S-04 (x - "should")	should not be increased by more than 500,000,000 (500M) units in any epoch (5 days)
maxBlockExecutionUnits[steps]	MBEU-S-01 (y)	must not exceed 40,000,000,000 (40Bn) units
	MBEU-S-02 (y)	must not be negative

Param Name	Parameter/Guardrail	Value
	MBEU-S-03 (x - "should")	should not be changed (increased or decreased) by more than 2,000,000,000 (2Bn) units in any epoch (5 days)
	MBEU-S-04a (x - unquantifiable)	The impact of the change to maxBlockExecutionUnits[steps] must be confirmed by detailed benchmarking/simulation and not exceed the requirements of the block diffusion/propagation time budgets, as also impacted by maxBlockExecutionUnits[memory] and maxBlockBodySize. Any increase must also consider previously identified future requirements for the total block size (maxBlockBodySize) measured against the total block diffusion target of 3s with 95% block propagation within 5s. Future Plutus performance improvements may allow the per-block step limit to be increased, but must be balanced against the overall diffusion limits as specified in the previous sentence, and future requirements
MEU *not identified*	MEU-S-01 (~ - no access to existing parameter values)	maxBlockExecutionUnits[steps] must not be less than maxTxExecutionUnits[steps]

Block Header Size

Paramter: `maxBlockHeaderSize`

The size of the block header.

Param Name	Parameter/Guardrail	Value
maxBlockHeaderSize	MBHS-01 (y)	must not exceed 5,000 Bytes
	MBHS-02 (y)	must not be negative
	MBHS-03 (x - "largest valid header" is subject to change)	must be large enough for the largest valid header
	MBHS-04 (x - "should")	should only normally be increased if the protocol changes
	MBHS-05 (x - "should")	should be within TCP's initial congestion window (3 or 10 MTUs)

2.4 Technical/Security Parameters

- The overall goals when managing the technical/security parameters are:
  1. Ensure the security of the Cardano Blockchain network in terms of decentralization and protection against a
  2. Enable changes to the Plutus language

Triggers for Change

1. Changes in the number of active SPOs
2. Changes to the Plutus language
3. Security threats
4. Cardano Community requests

Counter-indicators

• Economic concerns, e.g. when changing the number of stake pools

Core Metrics

• Number of stake pools
• Level of decentralization

Target Number of Stake Pools

Parameter: stakePoolTargetNum

Sets the target number of stake pools
  • The expected number of stake pools when the network is in the equilibrium state
  • Primarily a security parameter, ensuring decentralization by stake pool division/replication
  • Has an economic effect as well as a security effect — economic advice is also required when changing this par
  • Large changes in this parameter will trigger mass redelegation events

Param Name	Parameter/Guardrail	Value
stakePoolTargetNum	SPTN-01 (y)	must not be lower than 250
	SPTN-02 (y)	must not exceed 2,000
	SPTN-03 (y)	must not be negative
	SPTN-04 (y)	must not be zero

Pledge Influence Factor

Paramter: poolPledgeInfluence

Enables the pledge protection mechanism

Provides protection against Sybil attack
  • Higher values reward pools that have more pledge and penalize pools that have less pledge

Has an economic effect as well as technical effect — economic advice is also required

Param Name	Parameter/Guardrail	Value
poolPledgeInfluence	PPI-01 (y)	must not be lower than 0.1
	PPI-02 (y)	must not exceed 1.0
	PPI-03 (y)	must not be negative
	PPI-04 (x - "should")	should not vary by more than +/- 10% in any 18-epoch period (approximately 3 months)

Pool Retirement Window

Parameter poolRetireMaxEpoch

⊡

Defines the maximum number of epochs notice that a pool can give when planning to retire

Param Name	Parameter/Guardrail	Value
poolRetireMaxEpoch	PRME-01 (y)	must not be negative
	PRME-02 (x - "should")	should not be lower than 1

Collateral Percentage

Parameter: collateralPercentage

⊡

Defines how much collateral must be provided when executing a Plutus script as a percentage of the normal executi
  • Collateral is additional to fee payments
  • If a script fails to execute, then the collateral is lost
  • The collateral is never lost if a script executes successfully

Provides security against low-cost attacks by making it more expensive rather than less expensive to execute fail

Param Name	Parameter/Guardrail	Value
collateralPercentage	CP-01 (y)	must not be lower than 100
	CP-02 (y)	must not exceed 200
	CP-03 (y)	must not be negative
	CP-04 (y)	must not be zero

Maximum Number Of Collateral Inputs

Parameter: maxCollateralInputs

⊡

Defines the maximum number of inputs that can be used for collateral when executing a Plutus script

Param Name	Parameter/Guardrail	Value
`maxCollateralInputs`	MCI-01 (y)	must not be lower than 1

Maximum Value Size
Parameter: `maxValueSize`

The limit on the serialized size of the Value in each output.

Param Name	Parameter/Guardrail	Value
`maxValueSize`	MVS-01 (y)	must not exceed 12,288 Bytes (12KB)
	MVS-02 (y)	must not be negative
	MVS-03 (~ - no access to existing parameter values)	must be less than maxTxSize
	MVS-04 (~ - no access to existing parameter values)	must not be reduced
	MVS-05 (x - "sensible output" is subject to interpretation)	maxValueSize must be large enough to allow sensible outputs (e.g. any existing on-chain output or anticipated outputs that could be produced by new ledger rules)

Plutus Cost Models
Parameter: `costModels`

Define the base costs for each Plutus primitive in terms of CPU and memory unit

A different cost model is required for each Plutus version. Each cost model comprises many distinct cost model va

Param Name	Parameter/Guardrail	Value
`plutusCostModel` **OR** `costModel`	PCM-01 (x - unquantifiable)	Cost model values must be set by benchmarking on a reference architecture
	PCM-02 (x - primitives and language versions aren't introduced in transactions)	The cost model must be updated if new primitives are introduced or a new Plutus language version is added
	PCM-03a (~ - no access to Plutus cost model parameters)	Cost model values should not normally be negative. Negative values must be justified against the underlying cost model for the associated primitives

Param Name	Parameter/Guardrail	Value
	PCM-04 (~ - no access to Plutus cost model parameters)	A cost model must be supplied for each Plutus language version that the protocol supports

2.5 Governance Parameters

The overall goals when managing the governance parameters are to:
- Ensure governance stability
- Maintain a representative form of governance

Triggers for Change

Changes to governance parameters may be triggered by:
- Cardano Community requests
- Regulatory requirements
- Unexpected or unwanted governance outcomes
- Entering a state of no confidence

Counter-indicators

Changes may need to be reversed and/or should not be enacted in the event of:
- Unexpected effects on governance
- Excessive Layer 1 load due to on-chain voting or excessive numbers of governance actions

Core Metrics

All decisions on parameter changes should be informed by:
- Governance participation levels
- Governance behaviors and patterns
- Regulatory considerations
- Confidence in the governance system
- The effectiveness of the governance system in managing necessary change

Deposit for Governance Actions

Parameter: govDeposit

The deposit that is charged when submitting a governance action.
- Helps to limit the number of actions that are submitted

Param Name	Parameter/Guardrail	Value
govDeposit	GD-01 (y)	must not be negative
	GD-02 (y)	must not be lower than 1,000,000 (1 ada)

Param Name	Parameter/Guardrail	Value
	GD-03a (y)	must not exceed 10,000,000,000,000 (10 million ada)
	GD-04 (x - "should")	should be adjusted in line with fiat changes

Deposit for DReps

Parameter: dRepDeposit

The deposit that is charged when registering a DRep.
- Helps to limit the number of active DReps

Param Name	Parameter/Guardrail	Value
dRepDeposit	DRD-01 (y)	must not be negative
	DRD-02 (y)	must not be lower than 1,000,000 (1 ada)
	DRD-03 (y)	must not exceed 100,000,000,000 (100,000 ada)
	DRD-04 (x - "should")	should be adjusted in line with fiat changes

DRep Activity Period

Parameter: dRepActivity

The period (as a whole number of epochs) after which a DRep is considered to be inactive for vote calculation pur

Param Name	Parameter/Guardrail	Value
dRepActivity	DRA-01 (y)	must not be lower than 13 epochs (2 months)
	DRA-02 (y)	must not exceed 37 epochs (6 months)
	DRA-03 (y)	must not be negative
	DRA-04 (~ - no access to existing parameter values)	must be greater than govActionLifetime
	DRA-05 (x - "should")	should be calculated in human terms (2 months etc)

DRep and SPO Governance Action Thresholds

Paramter #1: dRepVotingThresholds[...]
Paramter #2: poolVotingThresholds[...])

Thresholds on the active voting stake that is required to ratify a specific type of governance action by either D
- Ensures legitimacy of the action

The threshold parameters are listed below:

dRepVotingThresholds:
- dvtCommitteeNoConfidence • dvtCommitteeNormal • dvtHardForkInitiation
- dvtMotionNoConfidence • dvtPPEconomicGroup • dvtPPGovGroup
- dvtPPNetworkGroup • dvtPPTechnicalGroup • dvtTreasuryWithdrawal
- dvtUpdateToConstitution

poolVotingThresholds:
- pvtCommitteeNoConfidence • pvtCommitteeNormal • pvtHardForkInitiation
- pvtMotionNoConfidence • pvtPPSecurityGroup

Param Name	Parameter/Guardrail	Value
Vote–General	VT-GEN-01 (y)	All thresholds must be greater than 50% and less than or equal to 100%
	VT-GEN-02a (y)	Economic, network and technical/security parameter thresholds must be in the range 51%-75%
	VT-GEN-03 (y)	Governance parameter thresholds must be in the range 75%-90%
Vote_Hardfork	VT-HF-01 (y)	Hard fork action thresholds must be in the range 51%-80%
Vote_Constitution	VT-CON-01 (y)	New Constitution or Guardrails Script action thresholds must be in the range 65%-90%
Vote_Constitutional–Committee	VT-CC-01 (y)	Update Constitutional Committee action thresholds must be in the range 51%-90%
Vote_No–Confidence	VT-NC-01 (y)	No confidence action thresholds must be in the range 51%-75%

Governance Action Lifetime

Paramter: govActionLifetime

The period after which a governance action will expire if it is not enacted – as a whole number of epochs

Param Name	Parameter/Guardrail	Value
govActionLifetime	GAL-01 (y)	must not be lower than 1 epoch (5 days)
	GAL-03 (x - "should")	should not be lower than 2 epochs (10 days)
	GAL-02 (y)	must not exceed 15 epochs (75 days)

Param Name	Parameter/Guardrail	Value
	GAL-04 (x - "should")	should be calibrated in human terms (eg 30 days, two weeks), to allow sufficient time for voting etc. to take place
	GAL-05 (~ - no access to existing parameter values)	must be less than dRepActivity

Maximum Constitutional Committee Term

Parameter: committeeMaxTermLength

The limit on the maximum term length that a committee member may serve

Param Name	Parameter/Guardrail	Value
committeeMaxTermLength	CMTL-01a (y)	must not be zero
	CMTL-02a (y)	must not be negative
	CMTL-03a (y)	must not be lower than 18 epochs (90 days, or approximately 3 months)
	CMTL-04a (y)	must not exceed 293 epochs (approximately 4 years)
	CMTL-05a (x - "should")	should not exceed 220 epochs (approximately 3 years)

The Minimum Size Of The Constitutional Committee

Parameter: committeeMinSize

The least number of members that can be included in a Constitutional Committee following a governance action to c

Param Name	Parameter/Guardrail	Value
committeeMinSize	CMS-01 (y)	must not be negative
	CMS-02 (y)	must not be lower than 3
	CMS-03 (y)	must not exceed 10

2.6. Monitoring and Reversion of Parameter Changes

All network parameter changes must be monitored carefully for no less than 2 epochs (10 days)
- Changes must be reverted as soon as possible if block propagation delays exceed 4.5s for more than 5% of bloc

All other parameter changes should be monitored
- The reversion plan should be implemented if the overall effect on performance, security, functionality or lor

A specific reversion/recovery plan must be produced for each parameter change. This plan must include:
  • Which parameters need to change and in which ways in order to return to the previous state (or a similar stat
  • How to recover the network in the event of disastrous failure

This plan should be followed if problems are observed following the parameter change. Note that not all changes c

2.7. Non-Updatable Protocol Parameters

Some fundamental protocol parameters cannot be changed by the Protocol Parameter Update governance action.
These parameters can only be changed in a new Genesis file as part of a hard fork.
It is not necessary to provide specific guardrails on updating these parameters.

3. Guardrails and Guidelines on Treasury Withdrawal Actions

Treasury withdrawal actions specify the destination and amount of a number of withdrawals from the Cardano treasu

Treasury
Parameter: TREASURY

Param Name	Parameter/Guardrail	Value
TREASURY	TREASURY-01a (x)	A net change limit for the Cardano treasury's balance per period of time must be agreed by the DReps via an on-chain governance action with a threshold of greater than 50% of the active voting stake
	TREASURY-02a (x)	Withdrawals from the Cardano Blockchain treasury made pursuant to an approved Cardano Blockchain ecosystem budget must not exceed the net change limit for the Cardano Treasury's balance per period of time
	TREASURY-03a (x)	Withdrawals from the Cardano Blockchain treasury must be denominated in ada
	TREASURY-04a (x)	Withdrawals from the Cardano Blockchain treasury must not be ratified until there is a Cardano Community approved Cardano Blockchain ecosystem budget then in effect pursuant to a previous on-chain governance action agreed by the DReps with a threshold of greater than 50% of the active voting stake

4. Guardrails and Guidelines on Hard Fork Initiation Actions

The hard fork initiation action requires both a new major and a new minor protocol version to be specified.

- As positive integers

As the result of a hard fork, new updatable protocol parameters may be introduced. Guardrails may be defined for

Hardfork
Parameter: HARDFORK

Param Name	Parameter/Guardrail	Value
HARDFORK	HARDFORK-01 (~ - no access to existing parameter values)	The major protocol version must be the same as or one greater than the major version that will be enacted immediately prior to this change. If the major protocol version is one greater, then the minor protocol version must be zero
	HARDFORK-02a (~ - no access to existing parameter values)	Unless the major protocol version is also changed, the minor protocol version must be greater than the minor version that will be enacted immediately prior to this change
	HARDFORK-03 (~ - no access to existing parameter values)	At least one of the protocol versions (major or minor or both) must change
	HARDFORK-04a (x)	At least 85% of stake pools by active stake should have upgraded to a Cardano Blockchain node version that is capable of processing the rules associated with the new protocol version
	HARDFORK-05 (x)	Any new updatable protocol parameters that are introduced with a hard fork must be included in this Appendix and suitable guardrails defined for those parameters
	HARDFORK-06 (x)	Settings for any new protocol parameters that are introduced with a hard fork must be included in the appropriate Genesis file
	HARDFORK-07 (x)	Any deprecated protocol parameters must be indicated in this Appendix
	HARDFORK-08 (~ - no access to Plutus cost model parameters)	New Plutus versions must be supported by a version-specific Plutus cost model that covers each primitive that is available in the new Plutus version

5. Guardrails and Guidelines on Update Constitutional Committee or Threshold Actions

Update Constitutional Committee or Threshold governance actions may change the size, composition or required voti

Update Constitutional Committee

Parameter: UPDATE

Param Name	Parameter/Guardrail	Value
UPDATE	UPDATE-CC-01a (x)	Update Constitutional Committee and/or threshold and/or term governance actions must not be ratified until ada holders have ratified through an on-chain governance action this Constitution

6. Guardrails and Guidelines on New Constitution or Guardrails Script Actions

Parameter: NEW—CONSTITUTION

New constitution or Guardrails Script actions change the hash of the on—chain Constitution and the associated Gua

New Constitution

Param Name	Parameter/Guardrail	Value
NEW—CONSTITUTION	NEW-CONSTITUTION-01a (x)	A New Constitution or Guardrails Script governance action must be submitted to define any required guardrails for new parameters that are introduced via a Hard Fork governance action
	NEW-CONSTITUTION-02 (x)	If specified, the new Guardrails Script must be consistent with this Constitution

7. Guardrails and Guidelines on No Confidence Actions

No confidence actions signal a state of no confidence in the governance system. No guardrails are imposed on No C

GUARDRAILS: NONE

8. GUARDRAILS AND GUIDELINES ON INFO ACTIONS

Info actions are not enacted on—chain. No guardrails are imposed on Info actions.

GUARDRAILS: NONE

9. List of Protocol Parameter Groups

The protocol parameters are grouped by type, allowing different thresholds to be set for each group.

The network parameter group consists of:

Param Name	Parameter/Guardrail
maximum block body size	`maxBlockBodySize`
maximum transaction size	`maxTxSize`
maximum block header size	`maxBlockHeaderSize`
maximum size of a serialized asset value	`maxValueSize`
maximum script execution units in a single transaction	`maxTxExecutionUnits[steps]`
maximum script execution units in a single block	`maxBlockExecutionUnits[steps]`
maximum number of collateral inputs	`maxCollateralInputs`

The economic parameter group consists of:

Param Name	Parameter/Guardrail
minimum fee coefficient	`txFeePerByte`
minimum fee constant	`txFeeFixed`
minimum fee per byte for reference scripts	`minFeeRefScriptCoinsPerByte`
delegation key lovelace deposit	`stakeAddressDeposit`
pool registration lovelace deposit	`stakePoolDeposit`
monetary expansion	`monetaryExpansion`
treasury expansion	`treasuryCut`
minimum fixed rewards cut for pools	`minPoolCost`
minimum lovelace deposit per byte of serialized UTxO	`coinsPerUTxOByte`
prices of Plutus execution units	`executionUnitPrices[priceSteps/priceMemory]`

The technical/security parameter group consists of:

Param Name	Parameter/Guardrail
pool pledge influence	poolPledgeInfluence
pool retirement maximum epoch	poolRetireMaxEpoch)
desired number of pools	stakePoolTargetNum
Plutus execution cost models	costModels
proportion of collateral needed for scripts	collateralPercentage

The governance parameter group consists of:

Param Name	Parameter/Guardrail
governance voting thresholds	dRepVotingThresholds[...]
	poolVotingThresholds[...]
governance action maximum lifetime in epochs	govActionLifetime
governance action deposit*	govActionDeposit
DRep deposit amount	dRepDeposit
DRep activity period in epochs	dRepActivity
minimal constitutional committee size	committeeMinSize
maximum term length (in epochs) for the constitutional committee members	