Diffchecker

List of changes from v2.0 to v2.3

Explain

The document has undergone several textual modifications, primarily focused on standardizing terminology and improving grammatical clarity.

- **Terminology Standardization:** A significant and recurring change is the replacement of "ada" with "Ada Holders" when referring to the owners of the Cardano governance token. This was applied in various contexts, including:
  - In the Preamble, specifically in relation to the rights of token owners 3.
  - In the definition of "Delegated Representative" 5.
  - In the "Participation Rights of Ada Holders" section 17.
  - In the "Economic Parameters" section 70 71.
  - In the "Update Committee" actions guardrails 166.
  - In the "Framing Notes" of Appendix II 175.
- **Grammar and Punctuation:** Several minor grammatical adjustments were made for improved readability.
  - Commas have been added to lists to ensure proper separation of items, such as in the Preamble: "identity, value, and governance" 1 and "identity, value, and governance" 13.
  - The capitalization of specific terms has been standardized. For instance, "Cardano Community Member" is now consistently capitalized 4.
  - Punctuation within quoted terms has been adjusted, moving from using quotation marks around phrases like `"Parameter Update"` to using them consistently as `"Parameter Update"` 27 59.
  - The use of "and" in lists has been made more consistent, for example, in the Preamble 1.
- **Phrasing and Clarity:** Some phrases have been reworded for greater precision and conciseness.
  - 6: The definition of "Net Change Limit" was rephrased from "the maximum amount or percentage by which the Cardano Treasury may not be reduced by in a given period" to "The maximum allowed amount or percentage of lovelace that may be removed from the Cardano Treasury in a given period."
  - 9: The description for a "Treasury Withdrawal Recipient" was updated from "treasury withdrawal governance action" to `"Treasury Withdrawals" action`.
  - 15 16: Section headers and introductory text were slightly rephrased for clarity and conciseness.
  - 28: The introduction to the "Treasury Withdrawals" action standards was clarified.
- **Technical Terminology Updates:**
  - The description for "Stake Pool Operator" was updated in 7 to specify controlling "cold key(s) of a block-producing node" rather than just manifesting intent through signed transactions.

- References to specific actions were standardized, for example, changing `"Parameter Update"` to `"Parameter Update"` and `"Treasury Withdrawal"` to `"Treasury Withdrawals"` in various contexts 27 58 59 63 157 160 161.
- The term "bytes" has been consistently used in place of "Bytes" when referring to data size in Appendix I 95 96 97 105 138.
- Several instances of "steps/memory" were standardized to "steps/memory" within parentheses 67 82 110 121 170.

- **Structural and Formatting Adjustments:**
  - Some minor formatting changes were made, such as ensuring consistent capitalization and spacing.
  - The use of quotation marks around specific action types like "Parameter Update" and "Treasury Withdrawals" was standardized 27 59 63 157 160 161.

− 302 removals 2002 lines

```
**CARDANO BLOCKCHAIN ECOSYSTEM CONSTITUTION**
==========

**PREAMBLE**
----------

Cardano is a decentralized ecosystem of blockchain technology, smart
contracts, and community governance, committed to improving economic,
political, and social systems for everyone, everywhere. By offering this
foundational infrastructure, Cardano empowers individuals and
communities to manage their identity, value and governance, fostering
the emergence of decentralized applications, businesses and network
states.

Through unbiased processing of immutable data, we, the participants of
the Cardano Community, consisting of individuals, organizations,
```

+ 268 additions 1968 lines

```
**CARDANO BLOCKCHAIN ECOSYSTEM CONSTITUTION**
==========

**PREAMBLE**
----------

Cardano is a decentralized ecosystem of blockchain technology, smart
contracts, and community governance, committed to improving economic,
political, and social systems for everyone, everywhere. By offering this
foundational infrastructure, Cardano empowers individuals and
communities to manage their identity, value, and governance, fostering
the emergence of decentralized applications, businesses, and network
states.

Through unbiased processing of immutable data, we, the participants of
the Cardano Community, consisting of individuals, organizations,
```

```
contributors and others, choose to follow in the footsteps of the early
Internet and cryptocurrency pioneers, who first forged bonds of
community through digital technologies. We are guided by our shared
principles and tenets as we exercise our self-governance by balancing
decentralized decision-making with accountability and safeguarding the
security of the Cardano Blockchain.

Recognizing the need for a more robust and dynamic governance framework,
that neither relies nor depends upon traditional nation-state governance
systems, but instead relies on self-governance by the Cardano Community,
utilizing, wherever possible and beneficial, blockchain technology in
the governance process, we hereby establish this Cardano Constitution to
govern the Cardano Blockchain ecosystem, ensure the continuity of the
Cardano Blockchain, and guard the rights of those who utilize it and the
rights of those who own ada.

With these purposes in mind, we, the Cardano Community, affirm our
intention to abide by this Constitution in order to participate in the
governance of the Cardano Blockchain ecosystem. We invite all who share
our values to join us for as long as they wish, while honoring the
```

```
contributors, and others, choose to follow in the footsteps of the early
Internet and cryptocurrency pioneers, who first forged bonds of
community through digital technologies. We are guided by our shared
principles and tenets as we exercise our self-governance by balancing
decentralized decision-making with accountability and safeguarding the
security of the Cardano Blockchain.

Recognizing the need for a more robust and dynamic governance framework,
that neither relies nor depends upon traditional nation-state governance
systems, but instead relies on self-governance by the Cardano Community,
utilizing, wherever possible and beneficial, blockchain technology in
the governance process, we hereby establish this Cardano Constitution to
govern the Cardano Blockchain ecosystem, ensure the continuity of the
Cardano Blockchain, and guard the rights of those who utilize it and the
rights of Ada Holders.

With these purposes in mind, we, the Cardano Community, affirm our
intention to abide by this Constitution in order to participate in the
governance of the Cardano Blockchain ecosystem. We invite all who share
our values to join us for as long as they wish, while honoring the
```

```
freedom to take another path.

**DEFINED TERMS**
-----------------

1.  Active Voting Stake. The total amount of lovelace that is delegated
    to active DReps or SPOs. This stake is used as the basis for
    calculating voting thresholds and adjudicating proposed Governance
    action outcomes. It excludes stake delegated to inactive DReps, the
    predefined abstain voting option, unregistered stake, and registered
    undelegated stake.

2.  Ada Holders. Persons who directly control the private key(s) to ada
    token(s).

3.  Cardano Community. The collective group of all individuals and
    organizations that, in embracing the shared principles and
    objectives set forth in the Cardano Blockchain Ecosystem
    Constitution, own ada, develop, build on, support, maintain,
    contribute to, and use the Cardano Blockchain.

4.  Cardano Community member. Means any participant, individual or
    organization in the Cardano Community, including the CC.

5.  Constitutional Committee (CC). The governing body and its component
    elected seats charged with ensuring that applicable
```

```
freedom to take another path.

**DEFINED TERMS**
-----------------

1.  Active Voting Stake. The total amount of lovelace that is delegated
    to active DReps or SPOs. This stake is used as the basis for
    calculating voting thresholds and adjudicating proposed Governance
    action outcomes. It excludes stake delegated to inactive DReps, the
    predefined abstain voting option, unregistered stake, and registered
    undelegated stake.

2.  Ada Holders. Persons who directly control the private key(s) to ada
    token(s).

3.  Cardano Community. The collective group of all individuals and
    organizations that, in embracing the shared principles and
    objectives set forth in the Cardano Blockchain Ecosystem
    Constitution, own ada, develop, build on, support, maintain,
    contribute to, and use the Cardano Blockchain.

4.  Cardano Community Member. Any participant, individual or
    organization in the Cardano Community, including the CC.

5.  Constitutional Committee (CC). The governing body and its component
    elected seats charged with ensuring that applicable
```

governance
63 actions take effect on the Cardano Blockchain only if in alignment
64 with the principles and provisions set forth in the Cardano
65 Blockchain Ecosystem Constitution.
66
67 6. Constitutional Committee member (CC member). A person, whether an
68 individual or organization, that serves as a member of the
69 Constitutional Committee.
70
71 7. Delegated Representative (DRep). The individual or entity registered
72 to vote with respect to on-chain governance actions for its own
73 behalf or on behalf of other owners of ada.
74
75 8. Net Change Limit. Means the maximum amount or percentage by which
76 the Cardano Treasury may not be reduced by in a given period.
77
78 9. Stake Pool Operator (SPO). An individual or entity that manifests
79 intent through the signed transactions of a Stake Pool.
80
81 10. Stake Pool. A Stake Pool Operator's Block producing node, identified
82 by a unique Stake Pool ID, which aggregates applicable Delegator
83 stake, forges and validates Blocks, and facilitates contributions of

governance
63 actions take effect on the Cardano Blockchain only if in alignment
64 with the principles and provisions set forth in the Cardano
65 Blockchain Ecosystem Constitution.
66
67 6. Constitutional Committee member (CC member). A person, whether an
68 individual or organization, that serves as a member of the
69 Constitutional Committee.
70
71 7. Delegated Representative (DRep). The individual or entity registered
72 to vote with respect to on-chain governance actions on its own
73 behalf or on behalf of other Ada Holders.
74
75 8. Net Change Limit. The maximum allowed amount or percentage of
76 lovelace that may be removed from the Cardano Treasury in a given
77 period.
78
79 9. Stake Pool Operator (SPO). An individual or entity that controls
80 cold key(s) of a block-producing node of a Stake Pool.
81
82 10. Stake Pool. A Stake Pool Operator's block producing node, identified
83 by a unique Stake Pool ID, which aggregates applicable Delegator
84 stake, forges and validates Blocks, and facilitates contributions of

```
    the SPO to the Cardano Blockchain's security, decentralization,
    consensus mechanism, and governance process.

11. Treasury Withdrawal Recipient. A person or entity who is indicated as
    the recipient of ada from the Cardano Treasury in the relevant
    treasury withdrawal governance action

**ARTICLE I. CARDANO BLOCKCHAIN TENETS AND GUARDRAILS**
--------------------------------------------------

### **Section 1 Guiding Tenets**

These below Tenets shall guide all Cardano Community members and
proposed governance actions shall be evaluated in accordance with these
Tenets. The order in which the below Tenets appear is not intended to
represent a priority among Tenets.

TENET 1 Transactions on the Cardano Blockchain shall not be slowed down
or censored and shall be expediently served for their intended purpose.

TENET 2 The cost of transactions on the Cardano Blockchain shall be
predictable and not unreasonable.

TENET 3 Anyone desiring to develop and deploy applications on the
Cardano Blockchain shall not unreasonably be prevented from
```

```
    the SPO to the Cardano Blockchain's security, decentralization,
    consensus mechanism, and governance process.

11. Treasury Withdrawal Recipient. A person or entity who is indicated as
    the recipient of ada from the Cardano Treasury in the relevant
    "Treasury Withdrawals" action.

**ARTICLE I. CARDANO BLOCKCHAIN TENETS AND GUARDRAILS**
--------------------------------------------------

### **Section 1 Guiding Tenets**

The following Tenets shall guide all Cardano Community members and
proposed governance actions shall be evaluated in accordance with these
Tenets. The order in which the Tenets below appear is not intended to
represent a priority among Tenets.

TENET 1 Transactions on the Cardano Blockchain shall not be slowed down
or censored and shall be expediently served for their intended purpose.

TENET 2 The cost of transactions on the Cardano Blockchain shall be
predictable and not unreasonable.

TENET 3 Anyone desiring to develop and deploy applications on the
Cardano Blockchain shall not be unreasonably prevented from
```

```
developing
and deploying such applications as intended.

TENET 4 Contributions by the Cardano Community on the Cardano Blockchain
shall be recognized, recorded and assessed fairly through reward sharing
with SPOs, potential compensation to DReps and CC members, and appropriate tokenomics.

TENET 5 The Cardano Blockchain shall not lock in an ada owner\'s value
or data without the owner\'s consent.

TENET 6 The Cardano Blockchain shall not unreasonably impede interoperability.

TENET 7 The Cardano Blockchain shall preserve in a safe manner any value
and information stored on the Cardano Blockchain.

TENET 8 The Cardano Blockchain shall not unreasonably spend resources.

TENET 9 All users of the Cardano Blockchain shall be treated fairly and
impartially, taking into account the collective desires of the Cardano
Community, consistent with the long-term sustainability and viability of
the Cardano Blockchain.

TENET 10 The Cardano Blockchain's monetary system shall promote
financial stability. This shall include seeking to preserve the value
```

```
developing
and deploying such applications as intended.

TENET 4 Contributions by the Cardano Community on the Cardano Blockchain
shall be recognized, recorded, and assessed fairly through reward sharing
with SPOs, potential compensation to DReps and CC members, and appropriate tokenomics.

TENET 5 The Cardano Blockchain shall not lock in an Ada Holder's value
or data without the Ada Holder's consent.

TENET 6 The Cardano Blockchain shall not unreasonably impede interoperability.

TENET 7 The Cardano Blockchain shall preserve in a safe manner any value
and information stored on the Cardano Blockchain.

TENET 8 The Cardano Blockchain shall not unreasonably spend resources.

TENET 9 All users of the Cardano Blockchain shall be treated fairly and
impartially, taking into account the collective desires of the Cardano
Community, consistent with the long-term sustainability and viability of
the Cardano Blockchain.

TENET 10 The Cardano Blockchain's monetary system shall promote
financial stability. This shall include seeking to preserve the value
```

and utility of ada as a medium of exchange, store of value, and unit of account. The total supply of ada shall not exceed 45,000,000,000 (45,000,000,000,000,000 lovelace).

Section 2 Implementation of Guardrails

1. The Cardano Blockchain shall operate in accordance with the Cardano Blockchain Guardrails Appendix to this Constitution. The Cardano Community may digitally codify certain Guardrails such that the Guardrails are directly programmed and implemented on the Cardano Blockchain using on-chain Guardrails Script or built-in ledger rules.

2. In the event there are inconsistencies between a Guardrail as set forth in the Cardano Blockchain Guardrails Appendix and any such Guardrail that has been programmed and implemented on the Cardano Blockchain, the version of such Guardrail that has been deployed directly on the Cardano Blockchain shall prevail unless and until replaced or revised pursuant to an on-chain governance action. The CC shall seek to reconcile such inconsistencies through the encouragement of an appropriate on-chain governance action.

and utility of ada as a medium of exchange, store of value, and unit of account. The total supply of ada shall not exceed 45,000,000,000 (45,000,000,000,000,000 lovelace).

Section 2 Implementation of Guardrails

1. The Cardano Blockchain shall operate in accordance with the Cardano Blockchain Guardrails Appendix to this Constitution. The Cardano Community may digitally codify certain Guardrails such that the Guardrails are directly programmed and implemented on the Cardano Blockchain using on-chain Guardrails Script or built-in ledger rules.

2. In the event there are inconsistencies between a Guardrail as set forth in the Cardano Blockchain Guardrails Appendix and any such Guardrail that has been programmed and implemented on the Cardano Blockchain, the version of such Guardrail that has been deployed directly on the Cardano Blockchain shall prevail unless and until replaced or revised pursuant to an on-chain governance action. The CC shall seek to reconcile such inconsistencies through the encouragement of an appropriate on-chain governance action.

```
**ARTICLE II. COMMUNITY AND GOVERNANCE**
--------------------------------------

### **Section 1 The Cardano Community**

1.  Cardano Community members are entitled to the rights, privileges,
    and protections of this Constitution, and are accordingly expected
    to support and uphold this Constitution, maintain the integrity of
    the ecosystem, participate in governance, and resolve disputes
    transparently.

2.  Cardano Community members are encouraged to collaborate on
    developing applications and to form organizations that support the
    Cardano Blockchain and the Cardano Community.

### **Section 2 Participation Rights of Ada Holders**

1.  Ada Holders are entitled to access and participate in the on-chain
    decision-making processes of the Cardano Blockchain ecosystem,
    including voting, proposing changes to the governance structure in
    accordance with the Guardrails, and otherwise taking part in
    on-chain governance actions.
```

```
**ARTICLE II. COMMUNITY AND GOVERNANCE**
--------------------------------------

### **Section 1 The Cardano Community**

1.  No formal membership shall be required to use, participate in and
    benefit from the Cardano Blockchain.
    Cardano Community members are entitled to the rights, privileges,
    and protections of this Constitution, and are accordingly expected
    to support and uphold this Constitution, maintain the integrity of
    the ecosystem, participate in governance, and resolve disputes
    transparently.

2.  Cardano Community members are encouraged to collaborate on
    developing applications and to form organizations that support the
    Cardano Blockchain and the Cardano Community.

### **Section 2 Participation Rights of Ada Holders**

1.  Ada Holders are entitled to access and participate in the on-chain
    decision-making processes of the Cardano Blockchain ecosystem,
    including voting, proposing changes to the governance structure in
    accordance with the Guardrails, and otherwise taking part in
    on-chain governance actions.
```

```
2.  Ada Holders can directly participate in governance actions by
    registering as DReps themselves or by delegating their voting
    rights to other registered DReps.

3.  Any Ada Holder shall be allowed to register as a DRep. A DRep may
    act in the interest of one or more Ada Holders.

4.  Any Ada Holder shall be allowed to delegate their voting stake to
    one or more registered DReps, including themselves.

5.  Ada Holders shall be allowed to change the delegation of their
    voting stake at any time.

6.  Ada owners who use third-party custodians or other designees to hold
    their ada may authorize, or withhold authorization from, such
    third parties to vote or delegate the owners' voting rights to
    registered DReps on the owners' behalf.

7.  Ada Holders have the right to a process for participating in,
    submitting and voting on on-chain governance actions that is
    open,transparent and protected from undue influence and
    manipulation.

### **Section 3 Decentralized Governance Framework**

1.  The Cardano Blockchain is governed by a decentralized, on-
```

```
2.  Ada Holders can directly participate in governance actions by
    registering as DReps themselves or by delegating their voting
    rights to other registered DReps.

3.  Any Ada Holder shall be allowed to register as a DRep. A DRep may
    act in the interest of one or more Ada Holders.

4.  Any Ada Holder shall be allowed to delegate their voting stake to
    one or more registered DReps, including themselves.

5.  Ada Holders shall be allowed to change the delegation of their
    voting stake at any time.

6.  Ada Holders who use third-party custodians or other designees to hold
    their ada may authorize or withhold authorization from, such
    third parties to vote or delegate the Ada Holders' voting rights to
    registered DReps on the Ada Holders' behalf.

7.  Ada Holders have the right to a process for participating in,
    submitting and voting on on-chain governance actions that is
    open, transparent, and protected from undue influence and
    manipulation.

### **Section 3 Decentralized Governance Framework**

1.  The Cardano Blockchain is governed by a decentralized, on-
```

```
chain
    model that, where beneficial, uses smart contracts and other
    blockchain tools to facilitate decision-making and ensure
    transparency.

2.  Three independent voting bodies - DReps, SPOs, and the
    CC - participate in on-chain voting; anyone holding multiple roles
    must publicly disclose such overlaps before engaging in any
    on-chain governance actions.

### **Section 4: Delegated Representatives**

1.  DReps have voting power equal to the number of Lovelace delegated to
    them.

2.  DReps may vote on all types of governance actions.

3.  DReps shall ensure that any compensation received in connection with
    their activities as a DRep is publicly disclosed in a timely
    manner through relevant governance communication channels.

4.  DReps shall not offer or provide compensation to an Ada Holder or in
    exchange for being appointed as a DRep or for voting on their
    behalf.

### **Section 5: Stake Pool Operators**

1.  Stake Pool Operators shall vote on the following governance
```

```
chain
    model that, where beneficial, uses smart contracts and other
    blockchain tools to facilitate decision-making and ensure
    transparency.

2.  Three independent voting bodies - DReps, SPOs, and the
    CC - participate in on-chain voting; anyone holding multiple roles
    must publicly disclose such overlaps before engaging in any
    on-chain governance actions.

### **Section 4 Delegated Representatives**

1.  DReps have voting power equal to the number of lovelace delegated to
    them.

2.  DReps may vote on all types of governance actions.

3.  DReps shall ensure that any compensation received in connection with
    their activities as a DRep is publicly disclosed in a timely
    manner through relevant governance communication channels.

4.  DReps shall not offer or provide compensation to an Ada Holder in
    exchange for being appointed as a DRep or for voting on their behalf.
```

```
    actions: (i) Motion of No Confidence, (ii) Update
    Committee/Threshold, (iii) Hard Fork Initiation, (iv) Protocol
    Parameter Changes that affect security-relevant parameters,
    and (v) Info Actions. For each of these governance actions, SPOs
    shall cast their votes separately from DReps in accordance with
    the Guardrails.

2.  SPOs shall publicly disclose if they are simultaneously voting as a
    DRep on the same governance actions.

3.  SPOs vote on \"Hard Fork Initiation\", "No Confidence", "Update
    Committee", and \"Parameter Update\" governance actions that
    affect security-critical parameters set forth under Parameters
    that are Critical to the Operation of the Blockchain in Section
    2.1 of the Cardano Blockchain Guardrails Appendix.

### **Section 6 Governance Action Standards**

1.  To ensure transparency in on-chain governance, proposed governance
    actions shall follow a standardized and legible format before
    being recorded or enacted on-chain. This format shall include a
    URL, hosting a document that outlines additional context for
```

```
### **Section 5 Stake Pool Operators**

1.  SPOs shall vote on the following governance actions: "No Confidence",
    "Update Committee", "Hard Fork Initiation", "Parameter Update" that
    affect security-relevant parameters, and "Info" actions.

### **Section 6 Governance Action Standards**

1.  To ensure transparency in on-chain governance, proposed governance
    actions shall follow a standardized and legible format before
    being recorded or enacted on-chain. This format shall include a
    URL hosting a document that outlines additional context for
```

```
the
    proposed governance action, and hash of this document. The
    document hosted by such a URL shall be immutable in nature and
    incapable of being altered after submission of the proposed
    governance action for on-chain voting.


2.  Each proposal shall provide sufficient rationale, including at
    minimum: a title, abstract, justification, and relevant supporting
    materials.

3.  The content of every on-chain governance action must be identical to
    the final off-chain version of the proposed action.

4.  \"Hard Fork Initiation\" and \"Parameter Update\" actions shall
    undergo sufficient technical review and scrutiny as mandated by
    the Guardrails to ensure that the governance action does not
    endanger the security, functionality, performance or long-term
    sustainability of the Cardano Blockchain.

### **Section 7 Treasury Withdrawal Governance Action Standards**

A Treasury withdrawal governance action must meet all of the
```

```
the
    proposed governance action, and the hash of this document. The
    document hosted by such a URL shall be immutable and incapable of
    being altered after submission, and the content of every on-chain
    Governance Action must be identical to the final off-chain version
    of the proposed action.

2.  Each proposal shall provide sufficient rationale, including at
    minimum: a title, abstract, justification, and relevant supporting
    materials.

3.  "Hard Fork Initiation" and "Parameter Update" actions shall
    undergo sufficient technical review and scrutiny as mandated by
    the Guardrails to ensure that the governance action does not
    endanger the security, functionality, performance, or long-term
    sustainability of the Cardano Blockchain.

### **Section 7 "Treasury Withdrawals" Action Standards**

A "Treasury Withdrawals" action must, in addition to the
```

following
requirements:

1. Treasury withdrawal governance actions must, in addition to the
   requirements at Section 6 above, specify the terms of the
   withdrawal. This shall include: the purpose of the withdrawal, the
   period for delivery of proposed activities which the withdrawal
   shall be used for, the relevant costs and expenses of the proposed
   activities, circumstances under which the withdrawal might be
   refunded to the Cardano treasury, the location and the identity of
   the recipient.

2. Treasury withdrawal governance actions shall disclose whether the
   prospective recipient of the Treasury withdrawal governance action
   has received ada from the Cardano Treasury within the last 24
   (twenty-four) months.

3. A Net Change Limit must be set. Treasury withdrawals must not exceed
   the Net Change Limit for that period.

4. All treasury withdrawal governance actions shall specify a process

requirements at Section 6, meet all of the following requirements:

1. "Treasury Withdrawals" actions must specify the terms of
   the withdrawal. This shall include: the purpose of the withdrawal,
   the period for delivery of proposed activities which the withdrawal
   shall be used for, the relevant costs and expenses of the proposed
   activities, circumstances under which the withdrawal might be
   refunded to the Cardano Treasury.

2. "Treasury Withdrawals" actions shall disclose whether the
   prospective recipient of the "Treasury Withdrawals" action
   has received ada from the Cardano Treasury within the last 24
   months.

```
295     for oversight of use of funds received from the Cardano Treasury.
296
297 5.  For Treasury Withdrawal Recipients requesting more than 1,000,000
298     ada during any two (2) year period, the following additional
299     requirements must all be met:
300
301     1.  Treasury withdrawal recipients shall appoint professional,
302         independent auditors to conduct an audit and provide a report
303         of treasury recipients' use of such funds received from the
304         treasury, which shall be made available to the Cardano Community
305         on no less than an annual basis.
306
307     2.  Treasury withdrawal governance actions shall make provision for
308         the costs of such an audit.
309
310     3.  Treasury withdrawal governance actions shall designate one or
311         more administrators responsible for monitoring how the funds
312         are used, and ensuring the deliverables are achieved as set
313         out in Section 7, paragraph 1 above.
314
```

```
275
276 3.  A Net Change Limit must be set. "Treasury Withdrawals" actions
277     must not exceed the Net Change Limit for that period.
278
279 4.  All "Treasury Withdrawals" actions shall specify a process
280     for oversight of use of funds received from the Cardano Treasury
281     and shall appoint independent auditors to conduct an audit and
282     provide a report of treasury recipients' use of such funds received
283     from the treasury, which shall be made available to the Cardano
284     Community on no less than an annual basis.
285
```

```
    4.  Any ada received from a Cardano Blockchain treasury withdrawal,
        so long as such ada is being held by an administrator prior to
        further disbursement to the Treasury Withdrawal Recipient,
        must be kept in one or more separate accounts that can be
        audited by the Cardano Community, and such accounts shall not
        be delegated to an SPO but must be delegated to the predefined
        auto abstain voting option.

6.  Treasury Withdrawal Recipients shall use treasury withdrawals for
    the purpose set out in Section 7, paragraph 1 above.

**ARTICLE III. CONSTITUTIONAL COMMITTEE**
--------------------------------

### **Section 1 Role and Scope**

1.  A CC shall be established as the branch of Cardano\'s on-chain
    governance process that ensures governance actions to be enacted
```

```
5.  "Treasury Withdrawals" actions shall designate one or more
    administrators responsible for monitoring how the funds are used,
    and ensuring the deliverables are achieved.

6.  Any ada received from a Cardano Blockchain treasury withdrawal,
    so long as such ada is being held by an administrator prior to
    further disbursement to the Treasury Withdrawal Recipient,
    must be kept in one or more separate accounts that can be
    audited by the Cardano Community, and such accounts shall not
    be delegated to an SPO but must be delegated to the predefined
    abstain voting option.

**ARTICLE III. CONSTITUTIONAL COMMITTEE**
--------------------------------

### **Section 1 Role and Scope**

1.  A CC shall be established as the branch of Cardano's on-chain
    governance process that ensures governance actions to be enacted
```

```
    on-chain are consistent with this Constitution.

2.  Each CC member shall have one vote.

3.  No governance action - other than a "No Confidence" or "Update
    Committee" action - may be implemented on-chain without
    affirmation by a requisite percentage of CC members.

4.  The CC shall be limited to voting on the constitutionality of
    governance actions, including any proposed or contemplated actions
    contained within Info actions.

### **Section 2 Composition and Terms**

1.  The CC shall be composed of such number of members and serve such
    term lengths as are sufficient to assure the ongoing integrity of
    the Cardano Blockchain, as determined from time to time by owners
    of ada.

2.  To assure continuity in the operation of the CC, the terms for CC
    members shall be staggered.

### **Section 3 Election Process, No Confidence and Removal**

1.  The CC shall be considered to be in one of the following two states
    at all times: a state of confidence or a state of no confidence.
```

```
    on-chain are consistent with this Constitution.

2.  Each CC member shall have one vote.

3.  No governance action - other than a "No Confidence" or "Update
    Committee" action - may be implemented on-chain without
    affirmation by a requisite percentage of CC members.

4.  The CC shall be limited to voting on the constitutionality of
    governance actions, including any proposed or contemplated actions
    contained within "Info" actions.

### **Section 2 Composition and Terms**

1.  The CC shall be composed of such number of members and serve such
    term lengths as are sufficient to assure the ongoing integrity of
    the Cardano Blockchain, as determined from time to time by Ada
    Holders.

2.  To assure continuity in the operation of the CC, the terms for CC
    members shall be staggered.

### **Section 3 Election Process, No Confidence and Removal**

1.  The CC shall be considered to be in one of the following two states
    at all times: a state of confidence or a state of no confidence.
```

```
    In a state of no confidence, members of the then standing CC must
    be reinstated or replaced using the "Update Committee" action
    before any other on-chain governance action, other than \"Info\"
    actions, may go forward. If a "No Confidence" action is enacted, a
    state of no confidence will result.

2.  The Cardano Community shall establish and make public a process from
    time to time for election of members of the CC consistent with the
    requirements of the Guardrails.

3.  In the event of a vote of no confidence or the removal of some CC
    members by "Update Committee" action, an election shall be held as
    soon as practical.

### **Section 4 Transparency and Conduct**

1.  CC processes shall be transparent, and the CC shall publish each
    decision.

2.  When voting that a governance action proposed to be executed
    on-chain is unconstitutional, each CC member casting such a vote
    shall set forth the basis for its decision with reference to
    specific Articles of this Constitution or provisions of the
    Cardano Blockchain Guardrails Appendix that are in conflict
```

```
    In a state of no confidence, members of the then-standing CC must
    be reinstated or replaced using the "Update Committee" action
    before any other on-chain governance action, other than "Info"
    actions, may go forward.

2.  The Cardano Community shall establish and make public a process from
    time to time for election of members of the CC consistent with the
    requirements of the Guardrails.

3.  In the event of a vote of no confidence or the removal of some CC
    members by "Update Committee" action, an election shall be held as
    soon as practical.

### **Section 4 Transparency and Conduct**

1.  CC processes shall be transparent, and the CC shall publish each
    decision.

2.  When voting that a governance action proposed to be executed
    on-chain is unconstitutional, each CC member casting such a vote
    shall set forth the basis for its decision with reference to
    specific Articles of this Constitution or provisions of the
    Cardano Blockchain Guardrails Appendix that are in conflict
```

```
with a
383     given proposal.
384
385 3.  CC members may be compensated
    for their efforts as members and
    shall
386     ensure that any compensation
    received in connection with such
387     activities is disclosed in a
    timely manner through relevant
388     governance communication
    channels.
389
390 **ARTICLE IV. AMENDMENT PROCESS**
391 ---------------------------------
392
393 ### **Section 1 Amendment Rules**
394
395 Amendments to this Constitution,
    including amendments to the
    Cardano
396 Blockchain Guardrails Appendix,
    shall require approval through a
397 collective decision-making
    process, by means of an on-chain
    governance
398 action supported by at least 65%
    of the then active voting stake,
    unless
399 a different threshold is
    specifically set forth in the
    Cardano
400 Blockchain Guardrails Appendix
    for the amendment of a particular
401 Guardrail, in which case that
    specified threshold shall apply.
402
403 **APPENDIX I. CARDANO BLOCKCHAIN
    GUARDRAILS**
404 ---------------------------------
    ------------
405
406 ### **1. Introduction**
407
408 To implement Cardano Blockchain
    on-chain governance, it is
    necessary to
409 establish sensible Guardrails
    that will enable the Cardano
```

```
with a
354     given proposal.
355
356 3.  CC members may be compensated
    for their efforts as members and
    shall
357     ensure that any compensation
    received in connection with such
358     activities is disclosed in a
    timely manner through relevant
359     governance communication
    channels.
360
361 **ARTICLE IV. AMENDMENT PROCESS**
362 ---------------------------------
363
364 ### **Section 1 Amendment Rules**
365
366 Amendments to this Constitution,
    including the Cardano Blockchain
367 Guardrails Appendix, shall
    require approval via an on-chain
    governance
368 action supported by at least 65%
    of the active voting stake at
    that
369 time, unless a different
    threshold is expressly provided
    in the Cardano
370 Blockchain Guardrails Appendix
    for the amendment of a particular
371 Guardrail, in which case that
    threshold shall apply.
372
373 **APPENDIX I. CARDANO BLOCKCHAIN
    GUARDRAILS**
374 ---------------------------------
    ------------
375
376 ### **1. Introduction**
377
378 To implement Cardano Blockchain
    on-chain governance, it is
    necessary to
379 establish sensible Guardrails
    that will enable the Cardano
```

```
Blockchain to
continue to operate in a secure and sustainable way.

This Appendix sets forth Guardrails that must be applied to Cardano
Blockchain on-chain governance actions, including changes to the protocol parameters and limits on treasury withdrawals. These Guardrails
cover both essential, intrinsic limits on settings, and recommendations
that are based on experience, research, measurement and governance
objectives.

These Guardrails are designed to avoid both unexpected and foreseeable
problems with the operation of the Cardano Blockchain. They are intended
to guide the choice of sensible parameter settings and avoid potential
problems with security, performance, functionality or long-term
sustainability. As described below, some of these Guardrails are
automatable and will be enforced via an on-chain Guardrails Script or
built-in ledger rules.

These Guardrails apply only to the Cardano Blockchain Layer 1 mainnet
environment. They are not intended to apply to test environments or to
other blockchains that use Cardano Blockchain software.
```

```
Blockchain to
continue to operate in a secure and sustainable way.

This Appendix sets forth Guardrails that must be applied to Cardano
Blockchain on-chain governance actions, including changes to the protocol parameters and limits on treasury withdrawals. These Guardrails
cover both essential, intrinsic limits on settings, and recommendations
that are based on experience, research, measurement, and governance
objectives.

These Guardrails are designed to avoid both unexpected and foreseeable
problems with the operation of the Cardano Blockchain. They are intended
to guide the choice of sensible parameter settings and avoid potential
problems with security, performance, functionality, or long-term
sustainability. As described below, some of these Guardrails are
automatable and will be enforced via an on-chain Guardrails Script or
built-in ledger rules.

These Guardrails apply only to the Cardano Blockchain Layer 1 mainnet
environment. They are not intended to apply to test environments or to
other blockchains that use Cardano Blockchain software.
```

Not all parameters for the Cardano Blockchain can be considered independently. Some parameters interact with other settings in an intrinsic way. Where known, these interactions are addressed in this Appendix.

While the Guardrails in this Appendix presently reflect the current state of technical insight, this Appendix should be treated as a living document. Implementation improvements, new simulations or performance evaluation results for the Cardano Blockchain may allow some of the restrictions contained in these Guardrails to be relaxed or tightened in due course.

Additional Guardrails may also be needed where, for example, new protocol parameters are introduced or existing ones are removed.

Amending, Adding or Deprecating Guardrails

The Guardrails set forth in this Appendix may be amended from time to time pursuant to an on-chain governance action that satisfies the applicable voting threshold as set forth in this Appendix. Any such amendment to any Guardrails shall require and be deemed to be an amendment to the Constitution itself, including any new Guardrails. Each

Not all parameters for the Cardano Blockchain can be considered independently. Some parameters interact with other settings in an intrinsic way. Where known, these interactions are addressed in this Appendix.

While the Guardrails in this Appendix presently reflect the current state of technical insight, this Appendix should be treated as a living document. Implementation improvements, new simulations or performance evaluation results for the Cardano Blockchain may allow some of the restrictions contained in these Guardrails to be relaxed or tightened in due course.

Additional Guardrails may also be needed where, for example, new protocol parameters are introduced or existing ones are removed.

Amending, Adding or Deprecating Guardrails

The Guardrails set forth in this Appendix may be amended from time to time pursuant to an on-chain governance action that satisfies the applicable voting threshold as set forth in this Appendix. Any such amendment to any Guardrails shall require and be deemed to be an amendment to the Constitution itself, including any new Guardrails. Each

```
Guardrail has a unique label. If the text of a Guardrail is amended, the
existing Guardrail will be deprecated and a new label will be used in
this Appendix. Similarly, if a Guardrail is deprecated, its label will
never be reused in the future. In all cases, the Guardrails that apply
to a governance action will be those in force at the time that the
governance action is submitted on-chain, regardless of any later
amendments.

#### **Terminology and Guidance**

This section provides supplementary definitions and interpretive
guidance for terms used throughout this Constitution and the Guardrails
Appendix.

Cardano Blockchain. The decentralized, public, peer-to-peer,
proof-of-stake distributed ledger system, designed to securely record,
verify, and synchronize transactions and data across the network while
enabling the execution of smart contracts and decentralized
applications. This system, powered by ada, is the longest chain of
Blocks with sufficient confirmations to be considered finalized starting
from Block Hash
5f20df933584822601f9e3f8c024eb5eb252fe8cefb24d1317dc3d432e940ebb, as
```

```
Guardrail has a unique label. If the text of a Guardrail is amended, the
existing Guardrail will be deprecated and a new label will be used in
this Appendix. Similarly, if a Guardrail is deprecated, its label will
never be reused in the future. In all cases, the Guardrails that apply
to a governance action will be those in force at the time that the
governance action is submitted on-chain, regardless of any later
amendments.

#### **Terminology and Guidance**

This section provides supplementary definitions and interpretive
guidance for terms used throughout this Constitution and the Guardrails
Appendix.

Cardano Blockchain. The decentralized, public, peer-to-peer,
proof-of-stake distributed ledger system, designed to securely record,
verify, and synchronize transactions and data across the network while
enabling the execution of smart contracts and decentralized
applications. This system, powered by ada, is the longest chain of
blocks with sufficient confirmations to be considered finalized starting
from block Hash
5f20df933584822601f9e3f8c024eb5eb252fe8cefb24d1317dc3d432e940ebb, as
```

```
475 forged on 2017-09-23 21:44:51 UTC
    on the Cardano Network.
476
477 Block. A container of data
    produced by a Stake Pool that
    includes, at
478 minimum, a header. Block
    production and Block forging are
    used
479 interchangeably.
480
481 Protocol. The algorithms, rules,
    and procedures that govern the
    exchange
482 of information on the Cardano
    Blockchain.
483
484 Protocol Parameters. Protocol
    settings that define how the
    Cardano
485 Blockchain functions; modifiable
    through applicable governance
486 processes.
487
488 Slot. The smallest denomination
    of time nested within an Epoch.
489
490 Epoch. A Protocol-determined
    interval characterized by a fixed
    number of
491 Slots. Each Slot\'s duration and
    sequence are governed by the
492 blockchain\'s consensus
    mechanisms and are associated
    with a universal
493 timestamp defined in UTC. It is
    used for operations including
    governance
494 voting, Block production
    leadership determination, rewards
    calculation,
495 and Hard Forks.
496
497 lovelace. The smallest unit of
    value for the native
    cryptocurrency of
498 the Cardano Blockchain, utilized
    for the network's security and
499 governance. It is distinguished
    from other native tokens by its
```

```
445 forged on 2017-09-23 21:44:51 UTC
    on the Cardano Network.
446
447 Block. A container of data
    produced by a Stake Pool that
    includes, at
448 minimum, a header. Block
    production and block forging are
    used
449 interchangeably.
450
451 Protocol. The algorithms, rules,
    and procedures that govern the
    exchange
452 of information on the Cardano
    Blockchain.
453
454 Protocol Parameters. Protocol
    settings that define how the
    Cardano
455 Blockchain functions; modifiable
    through applicable governance
456 processes.
457
458 Slot. The smallest denomination
    of time nested within an Epoch.
459
460 Epoch. A Protocol-determined
    interval characterized by a fixed
    number of
461 Slots. Each Slot's duration and
    sequence are governed by the
462 blockchain's consensus mechanisms
    and are associated with a
    universal
463 timestamp defined in UTC. It is
    used for operations including
    governance
464 voting, Block production
    leadership determination, rewards
    calculation,
465 and Hard Forks.
466
467 lovelace. The smallest unit of
    value for the native
    cryptocurrency of
468 the Cardano Blockchain, utilized
    for the network's security and
469 governance. It is distinguished
    from other native tokens by its
```

```
lack of
a policy ID and policy name.

ada. A superunit of lovelace,
with 1 ada equal to 1,000,000
lovelace.

Delegator. A private key holder
that delegates stake to a Stake
Pool for

Block production and network
security, to a DRep for
participation in

on-chain governance, or both. In
doing so, the delegator
contributes to
the operation and governance of
the Cardano Blockchain.

Active Block Production Stake.
The cumulative amount of stake,
measured
in lovelace, that is actively
delegated to Stake Pools and
utilized for

Block forging during the current
Epoch. This amount is determined
by a

snapshot of stake distribution
taken at the beginning of the
previous
Epoch, ensuring that it
accurately represents the
effective stake
available for securing and
maintaining the Cardano
Blockchain through

Block forging.

On-chain. A classification for
actions, transactions, or
governance
activities that are executed,
recorded, or implemented directly
on the
Cardano Blockchain. These
actions, transactions, or
governance
activities are permanently
validated and stored through the
```

```
lack of
a policy ID and policy name.

ada. A superunit of lovelace,
with 1 ada equal to 1,000,000
lovelace.

Delegator. A private key holder
that delegates stake to a Stake
Pool for

block production and network
security, to a DRep for
participation in

on-chain governance, or both. In
doing so, the delegator
contributes to
the operation and governance of
the Cardano Blockchain.

Active Block Production Stake.
The cumulative amount of stake,
measured
in lovelace, that is actively
delegated to Stake Pools and
utilized for

block forging during the current
Epoch. This amount is determined
by a

snapshot of stake distribution
taken at the beginning of the
previous
Epoch, ensuring that it
accurately represents the
effective stake
available for securing and
maintaining the Cardano
Blockchain through

block forging.

On-chain. A classification for
actions, transactions, or
governance
activities that are executed,
recorded, or implemented directly
on the
Cardano Blockchain. These
actions, transactions, or
governance
activities are permanently
validated and stored through the
```

blockchain's
consensus mechanism, ensuring their immutability and transparency.

Off-Chain. A classification for activities, proposals, or governance
decisions that are either not yet implemented on the Cardano Blockchain,
or not intended to be directly recorded on the blockchain. These may
include discussions, proposals, or agreements that exist outside the
blockchain and do not involve direct consensus or on-chain validation.

Governance Action. An on-chain proposal enabling participation in
shaping the future of the Cardano Blockchain Ecosystem through voting
transactions.

Hard Fork. A Protocol upgrade for the Cardano Blockchain that results in
a new Protocol version and necessitates coordinated adoption by network
participants.

Guardrails. A set of restrictions on Governance Actions to prevent
undesirable outcomes and assist voters in deciding whether the proposed
action complies with the Cardano Blockchain Ecosystem Constitution. Some
guardrails are enforced using the Guardrails Script or ledger rules to
prevent submission of the action, while others necessitate further
adjudication to determine if they violate the Constitution in ways

blockchain's
consensus mechanism, ensuring their immutability and transparency.

Off-Chain. A classification for activities, proposals, or governance
decisions that are either not yet implemented on the Cardano Blockchain,
or not intended to be directly recorded on the blockchain. These may
include discussions, proposals, or agreements that exist outside the
blockchain and do not involve direct consensus or on-chain validation.

Governance Action. An on-chain proposal enabling participation in
shaping the future of the Cardano Blockchain Ecosystem through voting
transactions.

Hard Fork. A Protocol upgrade for the Cardano Blockchain that results in
a new Protocol version and necessitates coordinated adoption by network
participants.

Guardrails. A set of restrictions on Governance Actions to prevent
undesirable outcomes and assist voters in deciding whether the proposed
action complies with the Cardano Blockchain Ecosystem Constitution. Some
guardrails are enforced using the Guardrails Script or ledger rules to
prevent submission of the action, while others necessitate further
adjudication to determine if they violate the Constitution in ways

```
the
Guardrails Script or ledger cannot check. Guardrails may be either
mandatory ("must"/"must not") or advisory ("should"/"should not"). The
latter allows for interpretive flexibility where necessary.

Guardrails Script. A smart contract script that checks specific proposed
Governance Actions, Hard Fork and Parameter update Governance Actions,
against automatically checkable Guardrails. The check is applied when
the Governance Action is proposed on-chain.

Motion of no confidence governance action ("No Confidence" action). A
motion to create a state of no confidence in the current constitutional
committee.

Update committee and/or threshold and/or terms governance action
("Update Committee" action). Changes to the members of the
constitutional committee and/or to its signature threshold and/or terms.

New Constitution or Guardrails Script governance action ("New
Constitution" action). A modification to the Constitution or Guardrails
Script, recorded as on-chain hashes.

Hard Fork Initiation governance action ("Hard Fork Initiation" action).
```

```
the
Guardrails Script or ledger cannot check. Guardrails may be either
mandatory ("must"/"must not") or advisory ("should"/"should not"). The
latter allows for interpretive flexibility where necessary.

Guardrails Script. A smart contract script that checks specific proposed
Governance Actions, "Hard Fork Initiation" and "Parameter Update"
actions, against automatically checkable Guardrails. The check is applied
when the Governance Action is proposed on-chain.

Motion of no confidence governance action ("No Confidence" action). A
motion to create a state of no confidence in the current constitutional
committee.

Update committee and/or threshold and/or terms governance action
("Update Committee" action). Changes to the members of the
Constitutional Committee and/or to its signature threshold and/or terms.

New Constitution or Guardrails Script governance action ("New
Constitution" action). A modification to the Constitution or Guardrails
Script, recorded as on-chain hashes.

Hard Fork Initiation governance action ("Hard Fork Initiation" action).
```

```
565 Triggers a non-backwards
    compatible upgrade of the
    network; requires a
566 prior software upgrade.
567
568 Protocol Parameter Changes
    governance action ("Parameter
    Changes" action
569 or "Parameter Update" action).
    Any change to one or more
    updatable
570 protocol parameters, excluding
    changes to major protocol
    versions
571 (\"hard forks\").
572
573 Treasury Withdrawals governance
    action ("Treasury Withdrawals"
    action).
574 Withdrawals from the treasury.
575
576 Info action ("Info" action). An
    action that has no effect on-
    chain,
577 other than an on-chain record.
578
579 Cardano Blockchain Treasury,
    Cardano Treasury, or Treasury. A
    supply of
580 ada controlled by the Protocol of
    the Cardano Blockchain; collected
    from
581 transaction fees, reserves, and
    other designated sources.
    Withdrawals
582 from this supply of ada are
    subject to the processes and
    restrictions
583 set forth in the Cardano
    Blockchain Ecosystem
    Constitution.
584
585 Cardano Blockchain Ecosystem. The
    collective ecosystem comprising
    the
586 Cardano Blockchain, the Cardano
    Community, and the tooling and
587 infrastructure utilized by the
    Cardano Community to support the
    Cardano
```

```
535 Triggers a non-backwards
    compatible upgrade of the
    network; requires a
536 prior software upgrade.
537
538 Protocol Parameter Changes
    governance action ("Parameter
    Changes" action
539 or "Parameter Update" action).
    Any change to one or more
    updatable
540 protocol parameters, excluding
    changes to major protocol
    versions
541 ("hard forks").
542
543 Treasury Withdrawals governance
    action ("Treasury Withdrawals"
    action).
544 Withdrawals from the treasury.
545
546 Info action ("Info" action). An
    action that has no effect on-
    chain,
547 other than an on-chain record.
548
549 Cardano Blockchain Treasury,
    Cardano Treasury, or Treasury. A
    supply of
550 ada controlled by the Protocol of
    the Cardano Blockchain; collected
    from
551 transaction fees, reserves, and
    other designated sources.
    Withdrawals
552 from this supply of ada are
    subject to the processes and
    restrictions
553 set forth in the Cardano
    Blockchain Ecosystem
    Constitution.
554
555 Cardano Blockchain Ecosystem. The
    collective ecosystem comprising
    the
556 Cardano Blockchain, the Cardano
    Community, and the tooling and
557 infrastructure utilized by the
    Cardano Community to support the
    Cardano
```

```
588 Blockchain in alignment with the
    shared principles and objectives
    set
589 forth in the Cardano Blockchain
    Ecosystem Constitution.
590
591 Expected. A reasonable
    presumption that the identified
    action, although
592 not mandatory, will occur.
593
594 Should/Should not. Where this
    Appendix says that a value
    \"should not\"
595 be set below or above some value,
    this means that the Guardrail is
    a
596 recommendation or guideline, and
    the specific value could be open
    to
597 discussion or alteration by a
    suitably expert group recognized
    by the
598 Cardano Community in light of
    experience with the Cardano
    Blockchain
599 governance system or the
    operation of the Cardano
    Blockchain.
600
601 Must/Must not. Where this
    Appendix says that a value
    \"must\" or \"must
602 not\" be set below or above some
    value, this means that the
    Guardrail is
603 a requirement that will be
    enforced by Cardano Blockchain
    ledger rules,
604 types or other built-in
    mechanisms where possible, and
    that if not
605 followed could cause a protocol
    failure, security breach or other
606 undesirable outcome.
607
608 Benchmarking. Benchmarking refers
    to careful system level
    performance
```

```
558 Blockchain in alignment with the
    shared principles and objectives
    set
559 forth in the Cardano Blockchain
    Ecosystem Constitution.
560
561 Expected. A reasonable
    presumption that the identified
    action, although
562 not mandatory, will occur.
563
564 Should/Should not. Where this
    Appendix says that a value
    "should not"
565 be set below or above some value,
    this means that the Guardrail is
    a
566 recommendation or guideline, and
    the specific value could be open
    to
567 discussion or alteration by a
    suitably expert group recognized
    by the
568 Cardano Community in light of
    experience with the Cardano
    Blockchain
569 governance system or the
    operation of the Cardano
    Blockchain.
570
571 Must/Must not. Where this
    Appendix says that a value "must"
    or "must
572 not" be set below or above some
    value, this means that the
    Guardrail is
573 a requirement that will be
    enforced by Cardano Blockchain
    ledger rules,
574 types or other built-in
    mechanisms where possible, and
    that if not
575 followed could cause a protocol
    failure, security breach or other
576 undesirable outcome.
577
578 Benchmarking. Benchmarking refers
    to careful system level
    performance
```

evaluation that is designed to show *a priori* that, for example, 95% of blocks will be diffused across a global network of Cardano Blockchain nodes within the required 5s time interval in all cases. This may require construction of specific test workflows and execution on a large test network of Cardano Blockchain nodes, simulating a global Cardano Blockchain network.

Performance analysis. Performance analysis refers to projecting theoretical performance, empirical benchmarking or simulation results to predict actual system behavior. For example, performance results obtained from tests in a controlled test environment (such as a collection of data centers with known networking properties) may be extrapolated to inform likely performance behavior in a real Cardano Blockchain network environment.

Simulation. Simulation refers to synthetic execution that is designed to inform performance/functionality decisions in a repeatable way. For example, the IOSim Cardano Blockchain module allows the operation of the networking stack to be simulated in a controlled and repeatable way, allowing issues to be detected before code deployment.

Performance Monitoring. Performance monitoring involves measuring the

evaluation that is designed to show *a priori* that, for example, 95% of blocks will be diffused across a global network of Cardano Blockchain nodes within the required 5s time interval in all cases. This may require construction of specific test workflows and execution on a large test network of Cardano Blockchain nodes, simulating a global Cardano Blockchain network.

Performance analysis. Performance analysis refers to projecting theoretical performance, empirical benchmarking or simulation results to predict actual system behavior. For example, performance results obtained from tests in a controlled test environment (such as a collection of data centers with known networking properties) may be extrapolated to inform likely performance behavior in a real Cardano Blockchain network environment.

Simulation. Simulation refers to synthetic execution that is designed to inform performance/functionality decisions in a repeatable way. For example, the IOSim Cardano Blockchain module allows the operation of the networking stack to be simulated in a controlled and repeatable way, allowing issues to be detected before code deployment.

Performance Monitoring. Performance monitoring involves measuring the

actual behavior of the Cardano Blockchain network, for example, by using timing probes to evaluate round-trip times, or test blocks to assess overall network health. It complements benchmarking and performance analysis by providing information about actual system behavior that cannot be obtained using simulated workloads or theoretical analysis.

Reverting Changes. Where performance monitoring shows that actual network behavior following a change is inconsistent with the performance requirements for the Cardano Blockchain, then the change must be reverted to its previous state if that is possible. For example, if the block size is increased from 100KB to 120KB and 95% of blocks are no longer diffused within 5s, then a change must be made to revert the block size to 100KB. If this is not possible, then one or more alternative changes must be made that will ensure that the performance requirements are met.

Severity Levels. Issues that affect the Cardano Blockchain network are classified by severity level, where:

- Severity 1 is a critical incident or issue with very high impact to the security, performance, functionality or sustainability of the Cardano Blockchain network

actual behavior of the Cardano Blockchain network, for example, by using timing probes to evaluate round-trip times, or test blocks to assess overall network health. It complements benchmarking and performance analysis by providing information about actual system behavior that cannot be obtained using simulated workloads or theoretical analysis.

Reverting Changes. Where performance monitoring shows that actual network behavior following a change is inconsistent with the performance requirements for the Cardano Blockchain, then the change must be reverted to its previous state if that is possible. For example, if the block size is increased from 100KB to 120KB and 95% of blocks are no longer diffused within 5s, then a change must be made to revert the block size to 100KB. If this is not possible, then one or more alternative changes must be made that will ensure that the performance requirements are met.

Severity Levels. Issues that affect the Cardano Blockchain network are classified by severity level, where:

- Severity 1 is a critical incident or issue with very high impact to the security, performance, functionality or sustainability of the Cardano Blockchain network

```
653
654 -   Severity 2 is a major
    incident or issue with
    significant impact to
655     the security, performance,
    functionality or sustainability
    of the
656     Cardano Blockchain network
657
658 -   Severity 3 is a minor
    incident or issue with low impact
    to the
659     security, performance,
    functionality or sustainability
    of the
660     Cardano Blockchain network
661
662 Future Performance Requirements.
    Planned development such as new
663 mechanisms for out of memory
    storage may impact block
    diffusion or other
664 times. When changing parameters,
    it is necessary to consider these
665 future performance requirements
    as well as the current operation
    of the
666 Cardano Blockchain. Until
    development is complete, the
    requirements will
667 be conservative but may then be
    relaxed to account for actual
    timing
668 behavior.
669
670 #### **Automated Checking
    (\"Guardrails Script\")**
671
672 A script hash is associated with
    the Constitution hash when a New
673 Constitution or Guardrails Script
    governance action is enacted. It
    acts
674 as an additional safeguard to the
    ledger rules and types, filtering
675 non-compliant governance actions.
676
677 The Guardrails Script only
    affects two types of governance
    actions:
678
```

```
623
624 -   Severity 2 is a major
    incident or issue with
    significant impact to
625     the security, performance,
    functionality or sustainability
    of the
626     Cardano Blockchain network
627
628 -   Severity 3 is a minor
    incident or issue with low impact
    to the
629     security, performance,
    functionality or sustainability
    of the
630     Cardano Blockchain network
631
632 Future Performance Requirements.
    Planned development such as new
633 mechanisms for out of memory
    storage may impact block
    diffusion or other
634 times. When changing parameters,
    it is necessary to consider these
635 future performance requirements
    as well as the current operation
    of the
636 Cardano Blockchain. Until
    development is complete, the
    requirements will
637 be conservative but may then be
    relaxed to account for actual
    timing
638 behavior.
639
640 #### **Automated Checking
    ("Guardrails Script")**
641
642 A script hash is associated with
    the Constitution hash when a New
643 Constitution or Guardrails Script
    governance action is enacted. It
    acts
644 as an additional safeguard to the
    ledger rules and types, filtering
645 non-compliant governance actions.
646
647 The Guardrails Script only
    affects two types of governance
    actions:
648
```

```
- \"Parameter Update\" actions, and

- \"Treasury Withdrawal\" actions.

The Guardrails Script is executed when either of these types of governance action is submitted on-chain. This avoids scenarios where, for example, an erroneous script could prevent the Cardano Blockchain from ever enacting a Hard Fork action, resulting in deadlock. There are three different situations that apply to Guardrail Script usage.

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 ledger changes could
    enable this.

Guardrails may overlap: in this case, the most restrictive set of Guardrails will apply.

Where a parameter is not explicitly listed in this document, then the Guardrail Script must not permit any changes to the parameter.
```

```
- "Parameter Update" actions, and

- "Treasury Withdrawals" action.

The Guardrails Script is executed when either of these types of governance action is submitted on-chain. This avoids scenarios where, for example, an erroneous script could prevent the Cardano Blockchain from ever enacting a Hard Fork action, resulting in deadlock. There are three different situations that apply to Guardrail Script usage.

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 ledger changes could
    enable this.

Guardrails may overlap: in this case, the most restrictive set of Guardrails will apply.

Where a parameter is not explicitly listed in this document, then the Guardrail Script must not permit any changes to the parameter.
```

```
Conversely, where a parameter is explicitly listed in this document but
no checkable Guardrails are specified, the Guardrail Script must not
impose any constraints on changes to the parameter.

### **2. Guardrails and Guidelines on \"Parameter Update\" actions**

Below are Guardrails and guidelines for changing updatable protocol
parameter settings via the \"Parameter Update\" action such that the
Cardano Blockchain is never in an unrecoverable state as a result of
such changes.

Note that, to avoid ambiguity, this Appendix uses the parameter name
that is used in \"Parameter Update\" actions rather than any other
convention.

##### **GUARDRAILS**

PARAM-01 (y) Any protocol parameter that is not explicitly named in this
document must not be changed by a \"Parameter Update\" 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.
```

```
Conversely, where a parameter is explicitly listed in this document but
no checkable Guardrails are specified, the Guardrail Script must not
impose any constraints on changes to the parameter.

### **2. Guardrails and Guidelines on "Parameter Update" actions**

Below are Guardrails and guidelines for changing updatable protocol
parameter settings via the "Parameter Update" action such that the
Cardano Blockchain is never in an unrecoverable state as a result of
such changes.

Note that, to avoid ambiguity, this Appendix uses the parameter name
that is used in "Parameter Update" actions rather than any other
convention.

##### **GUARDRAILS**

PARAM-01 (y) Any protocol parameter that is not explicitly named in this
document must not be changed by a "Parameter Update" 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.
```

```
728 Checkable Guardrails are shown by
    a (y)
729
730 ### **2.1. Critical Protocol
    Parameters**
731
732 The below protocol parameters are
    critical from a security point of
733 view.
734
735 #### **Parameters that are
    Critical to the Operation of the
    Blockchain**
736
737 -   *maximum block body size*
    (*maxBlockBodySize*)
738
739 -   *maximum transaction size*
    (*maxTxSize*)
740
741 -   *maximum block header size*
    (*maxBlockHeaderSize*)
742
743 -   *maximum size of a serialized
    asset value* (*maxValueSize*)
744
745 -   *maximum script
    execution/memory units in a
    single block*
746     (*maxBlockExecutionUnits\
    [steps/memory\]*)
747
748 -   *minimum fee coefficient*
    (*txFeePerByte*)
749
750 -   *minimum fee constant*
    (*txFeeFixed*)
751
752 -   *minimum fee per byte for
    reference scripts*
753
    (*minFeeRefScriptCoinsPerByte*)
754
755 -   *minimum lovelace deposit per
    byte of serialized UTxO*
756     (*utxoCostPerByte*)
757
758 -   *governance action deposit*
    (*govDeposit*)
759
```

```
698 Checkable Guardrails are shown by
    a (y)
699
700 ### **2.1. Critical Protocol
    Parameters**
701
702 The below protocol parameters are
    critical from a security point of
703 view.
704
705 #### **Parameters that are
    Critical to the Operation of the
    Blockchain**
706
707 -   *maximum block body size*
    (*maxBlockBodySize*)
708
709 -   *maximum transaction size*
    (*maxTxSize*)
710
711 -   *maximum block header size*
    (*maxBlockHeaderSize*)
712
713 -   *maximum size of a serialized
    asset value* (*maxValueSize*)
714
715 -   *maximum script
    execution/memory units in a
    single block*
716
    (*maxBlockExecutionUnits[steps/me
    mory]*)
717
718 -   *minimum fee coefficient*
    (*txFeePerByte*)
719
720 -   *minimum fee constant*
    (*txFeeFixed*)
721
722 -   *minimum fee per byte for
    reference scripts*
723
    (*minFeeRefScriptCoinsPerByte*)
724
725 -   *minimum lovelace deposit per
    byte of serialized UTxO*
726     (*utxoCostPerByte*)
727
728 -   *governance action deposit*
    (*govDeposit*)
729
```

```
##### **GUARDRAILS**

PARAM-03a (y) A parameter that is critical to the operation of the
blockchain 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 90 days should normally pass between the
publication of an off-chain proposal to change a parameter that is
critical to the operation of the blockchain 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**

-   *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*)
```

```
##### **GUARDRAILS**

PARAM-03a (y) A parameter that is critical to the operation of the
blockchain requires 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 90 days should normally pass between the
publication of an off-chain proposal to change a parameter that is
critical to the operation of the blockchain 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**

-   *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*)
```

```
786
787 -   *maximum term length (in
    epochs) for the Constitutional
    Committee
788     members*
    (*committeeMaxTermLength*)
789
790 ##### **GUARDRAILS**
791
792 PARAM-05a (y) DReps must vote
    \"yes\" with a collective support
    of more
793 than 50% of all active voting
    stake. This is enforced by the
    Guardrails
794 on the DRep voting thresholds.
795
796 PARAM-06a (x) At least 90 days
    should normally pass between the
797 publication of an off-chain
    proposal to change a parameter
    that is
798 critical to the governance system
    and the submission of the
799 corresponding on-chain governance
    action. This Guardrail may be
    relaxed
800 in the event of a Severity 1 or
    Severity 2 network issue
    following
801 careful technical discussion and
    evaluation.
802
803 ### **2.2. Economic Parameters**
804
805 The overall goals when managing
    economic parameters are to:
806
807 1.  Enable long-term economic
    sustainability for the Cardano
    Blockchain;
808
809 2.  Ensure that stake pools are
    adequately rewarded for
    maintaining the
810     Cardano Blockchain;
811
812 3.  Ensure that ada holders are
    adequately rewarded for using
    stake in
```

```
756
757 -   *maximum term length (in
    epochs) for the Constitutional
    Committee
758     members*
    (*committeeMaxTermLength*)
759
760 ##### **GUARDRAILS**
761
762 PARAM-05a (y) DReps must vote
    "yes" with a collective support
    of more
763 than 50% of all active voting
    stake. This is enforced by the
    Guardrails
764 on the DRep voting thresholds.
765
766 PARAM-06a (x) At least 90 days
    should normally pass between the
767 publication of an off-chain
    proposal to change a parameter
    that is
768 critical to the governance system
    and the submission of the
769 corresponding on-chain governance
    action. This Guardrail may be
    relaxed
770 in the event of a Severity 1 or
    Severity 2 network issue
    following
771 careful technical discussion and
    evaluation.
772
773 ### **2.2. Economic Parameters**
774
775 The overall goals when managing
    economic parameters are to:
776
777 1.  Enable long-term economic
    sustainability for the Cardano
    Blockchain;
778
779 2.  Ensure that stake pools are
    adequately rewarded for
    maintaining the
780     Cardano Blockchain;
781
782 3.  Ensure that Ada Holders are
    adequately rewarded for using
    stake in
```

```
    constructive ways, including when delegating ada for block
    production; and

4.  Balance economic incentives for different Cardano Blockchain
    ecosystem stakeholders, including but not limited to Stake Pool
    Operators, ada holders, DeFi users, infrastructure users,
    developers (e.g. DApps) and financial intermediaries (e.g.
    exchanges)

#### **Triggers for Change**

1.  Significant changes in the fiat value of ada resulting in potential
    problems with security, performance, functionality or long-term
    sustainability

2.  Changes in transaction volumes or types

3.  Community requests or suggestions

4.  Emergency situations that require changes to economic parameters

#### **Counter-indicators**

Changes to the economic parameters should not be made in isolation. They
need to account for:

-   External economic factors

-   Network security concerns

#### **Core Metrics**

-   Fiat value of ada resulting in potential problems with
```

```
    constructive ways, including when delegating ada for block
    production; and

4.  Balance economic incentives for different Cardano Blockchain
    ecosystem stakeholders, including but not limited to Stake Pool
    Operators, Ada Holders, DeFi users, infrastructure users,
    developers (e.g. DApps) and financial intermediaries (e.g.
    exchanges)

#### **Triggers for Change**

1.  Significant changes in the fiat value of ada resulting in potential
    problems with security, performance, functionality, or long-term
    sustainability

2.  Changes in transaction volumes or types

3.  Community requests or suggestions

4.  Emergency situations that require changes to economic parameters

#### **Counter-indicators**

Changes to the economic parameters should not be made in isolation. They
need to account for:

-   External economic factors

-   Network security concerns

#### **Core Metrics**

-   Fiat value of ada resulting in potential problems with
```

```
security,
    performance, functionality or long-term sustainability

-   Transaction volumes and types

-   Number and health of stake pools

-   External economic factors

#### **Changes to Specific Economic Parameters**

Transaction fee per byte (txFeePerByte) and fixed transaction fee
(txFeeFixed)

Defines the cost for basic transactions in lovelace:

*fee(tx) = txFeeFixed + txFeePerByte x nBytes(tx)*

##### **GUARDRAILS**

TFPB-01 (y) *txFeePerByte* must not be lower than 30 (0.000030 ada) This
protects against low-cost denial of service attacks

TFPB-02 (y) *txFeePerByte* must not exceed 1,000 (0.001 ada) This
ensures that transactions can be paid for

TFPB-03 (y) *txFeePerByte* must not be negative

TFF-01 (y) *txFeeFixed* must not be lower than 100,000 (0.1 ada) This
protects against low-cost denial of service attacks

TFF-02 (y) *txFeeFixed* must not exceed 10,000,000 (10 ada) This ensures
that transactions can be paid for
```

```
security,
    performance, functionality, or long-term sustainability

-   Transaction volumes and types

-   Number and health of stake pools

-   External economic factors

#### **Changes to Specific Economic Parameters**

Transaction fee per byte (txFeePerByte) and fixed transaction fee
(txFeeFixed)

Defines the cost for basic transactions in lovelace:

*fee(tx) = txFeeFixed + txFeePerByte x nBytes(tx)*

##### **GUARDRAILS**

TFPB-01 (y) *txFeePerByte* must not be lower than 30 (0.000030 ada) This
protects against low-cost denial of service attacks

TFPB-02 (y) *txFeePerByte* must not exceed 1,000 (0.001 ada) This
ensures that transactions can be paid for

TFPB-03 (y) *txFeePerByte* must not be negative

TFF-01 (y) *txFeeFixed* must not be lower than 100,000 (0.1 ada) This
protects against low-cost denial of service attacks

TFF-02 (y) *txFeeFixed* must not exceed 10,000,000 (10 ada) This ensures
that transactions can be paid for
```

```
878
879 TFF-03 (y) *txFeeFixed* must not
    be negative
880
881 TFGEN-01 (x - \"should\") To
    maintain a consistent level of
    protection
882 against denial-of-service
    attacks, *txFeeFixed* and
    *txFeePerByte*
883 should be adjusted whenever
    Plutus Execution prices are
    adjusted
884 (executionUnitPrices\
    [steps/memory\])
885
886 TFGEN-02 (x - unquantifiable) Any
    changes to *txFeeFixed* or
887 *txFeePerByte* must consider the
    implications of reducing the cost
    of a
888 denial-of-service attack or
    increasing the maximum
    transaction fee so
889 that it becomes impossible to
    construct a transaction.
890
891 #### **UTxO cost per byte
    (utxoCostPerByte)**
892
893 Defines the deposit (in lovelace)
    that is charged for each byte of
894 storage that is held in a UTxO.
    This deposit is returned when the
    UTxO
895 is no longer active.
896
897 -   Sets a minimum threshold on
    ada that is held within a single
    UTxO
898
899 -   Provides protection against
    low-cost denial of service attack
    on
900     UTxO storage. DoS protection
    decreases in line with the free
    node
901     memory (proportional to UTxO
    growth)
902
```

```
848
849 TFF-03 (y) *txFeeFixed* must not
    be negative
850
851 TFGEN-01 (x - "should") To
    maintain a consistent level of
    protection
852 against denial-of-service
    attacks, *txFeeFixed* and
    *txFeePerByte*
853 should be adjusted whenever
    Plutus Execution prices are
    adjusted
854 (executionUnitPrices[steps/memory
    ])
855
856 TFGEN-02 (x - "unquantifiable")
    Any changes to *txFeeFixed* or
857 *txFeePerByte* must consider the
    implications of reducing the cost
    of a
858 denial-of-service attack or
    increasing the maximum
    transaction fee so
859 that it becomes impossible to
    construct a transaction.
860
861 #### **UTxO cost per byte
    (utxoCostPerByte)**
862
863 Defines the deposit (in lovelace)
    that is charged for each byte of
864 storage that is held in a UTxO.
    This deposit is returned when the
    UTxO
865 is no longer active.
866
867 -   Sets a minimum threshold on
    ada that is held within a single
    UTxO
868
869 -   Provides protection against
    low-cost denial of service attack
    on
870     UTxO storage. DoS protection
    decreases in line with the free
    node
871     memory (proportional to UTxO
    growth)
872
```

```
903 -   Helps reduce long-term storage costs for node users by providing an
904     incentive to return UTxOs when no longer needed, or to merge
905     UTxOs.
906
907 ##### **GUARDRAILS**
908
909 UCPB-01 (y) *utxoCostPerByte* must not be lower than 3,000 (0.003 ada)
910
911 UCPB-02 (y) *utxoCostPerByte* must not exceed 6,500 (0.0065 ada)
912
913 UCPB-03 (y) *utxoCostPerByte* must not be zero
914
915 UCPB-04 (y) *utxoCostPerByte* must not be negative
916
917 UCPB-05a (x - \"should\") Changes should account for
918
919 1.  The acceptable cost of attack
920
921 2.  The acceptable time for an attack
922
923 3.  The acceptable memory configuration for full node users
924
925 4.  The sizes of UTxOs and
926
927 5.  The current total node memory usage
928
929 #### **Stake address deposit (stakeAddressDeposit)**
930
931 Ensures that stake addresses are retired when no longer needed
932
933 -   Helps reduce long-term storage costs
934
935 -   Helps limit CPU and memory costs in the ledger
```

```
873 -   Helps reduce long-term storage costs for node users by providing an
874     incentive to return UTxOs when no longer needed, or to merge
875     UTxOs.
876
877 ##### **GUARDRAILS**
878
879 UCPB-01 (y) *utxoCostPerByte* must not be lower than 3,000 (0.003 ada)
880
881 UCPB-02 (y) *utxoCostPerByte* must not exceed 6,500 (0.0065 ada)
882
883 UCPB-03 (y) *utxoCostPerByte* must not be zero
884
885 UCPB-04 (y) *utxoCostPerByte* must not be negative
886
887 UCPB-05a (x - "should") Changes should account for
888
889 1.  The acceptable cost of attack
890
891 2.  The acceptable time for an attack
892
893 3.  The acceptable memory configuration for full node users
894
895 4.  The sizes of UTxOs and
896
897 5.  The current total node memory usage
898
899 #### **Stake address deposit (stakeAddressDeposit)**
900
901 Ensures that stake addresses are retired when no longer needed
902
903 -   Helps reduce long-term storage costs
904
905 -   Helps limit CPU and memory costs in the ledger
```

936
937 The rationale for the deposit is to incentivize that scarce memory
938 resources are returned when they are no longer required. Reducing the
939 number of active stake addresses also reduces processing and memory
940 costs at the epoch boundary when calculating stake snapshots.
941
942 ##### **GUARDRAILS**
943
944 SAD-01 (y) *stakeAddressDeposit* must not be lower than 1,000,000 (1
945 ada)
946
947 SAD-02 (y) *stakeAddressDeposit* must not exceed 5,000,000 (5 ada)
948
949 SAD-03 (y) *stakeAddressDeposit* must not be negative
950
951 #### **Stake pool deposit (stakePoolDeposit)**
952
953 Ensures that stake pools are retired by the stake pool operator when no
954 longer needed by them
955
956 - Helps reduce long-term storage costs
957
958 The rationale for the deposit is to incentivize that scarce memory
959 resources are returned when they are no longer required. Rewards and
960 stake snapshot calculations are also impacted by the number of active
961 stake pools.
962
963 ##### **GUARDRAILS**
964
965 SPD-01 (y) *stakePoolDeposit* must not be lower than 250,000,000 (250
966 ada)

906
907 The rationale for the deposit is to incentivize that scarce memory
908 resources are returned when they are no longer required. Reducing the
909 number of active stake addresses also reduces processing and memory
910 costs at the epoch boundary when calculating stake snapshots.
911
912 ##### **GUARDRAILS**
913
914 SAD-01 (y) *stakeAddressDeposit* must not be lower than 1,000,000 (1
915 ada)
916
917 SAD-02 (y) *stakeAddressDeposit* must not exceed 5,000,000 (5 ada)
918
919 SAD-03 (y) *stakeAddressDeposit* must not be negative
920
921 #### **Stake pool deposit (stakePoolDeposit)**
922
923 Ensures that stake pools are retired by the stake pool operator when no
924 longer needed by them
925
926 - Helps reduce long-term storage costs
927
928 The rationale for the deposit is to incentivize that scarce memory
929 resources are returned when they are no longer required. Rewards and
930 stake snapshot calculations are also impacted by the number of active
931 stake pools.
932
933 ##### **GUARDRAILS**
934
935 SPD-01 (y) *stakePoolDeposit* must not be lower than 250,000,000 (250
936 ada)

```
967
968 SPD-02 (y) *stakePoolDeposit*
    must not exceed 500,000,000 (500
    ada)
969
970 SPD-03 (y) *stakePoolDeposit*
    must not be negative
971
972 #### **Minimum Pool Cost
    (minPoolCost)**
973
974 Part of the rewards mechanism
975
976 -   The minimum pool cost is
    transferred to the pool rewards
    address
977     before any delegator rewards
    are paid
978
979 ##### **GUARDRAILS**
980
981 MPC-01 (y) *minPoolCost* must not
    be negative
982
983 MPC-02 (y) *minPoolCost* must not
    exceed 500,000,000 (500 ada)
984
985 MPC-03 (x - \"should\")
    *minPoolCost* should be set in
    line with the
986 economic cost for operating a
    pool
987
988 #### **Treasury Cut
    (treasuryCut)**
989
990 Part of the rewards mechanism
991
992 -   The treasury cut portion of
    the monetary expansion is
    transferred to
993     the treasury before any pool
    rewards are paid
994
995 -   Can be set in the range 0.0-
    1.0 (0%-100%)
996
997 ##### **GUARDRAILS**
998
999 TC-01 (y) *treasuryCut* must not
    be lower than 0.1 (10%)
```

```
937
938 SPD-02 (y) *stakePoolDeposit*
    must not exceed 500,000,000 (500
    ada)
939
940 SPD-03 (y) *stakePoolDeposit*
    must not be negative
941
942 #### **Minimum Pool Cost
    (minPoolCost)**
943
944 Part of the rewards mechanism
945
946 -   The minimum pool cost is
    transferred to the pool rewards
    address
947     before any delegator rewards
    are paid
948
949 ##### **GUARDRAILS**
950
951 MPC-01 (y) *minPoolCost* must not
    be negative
952
953 MPC-02 (y) *minPoolCost* must not
    exceed 500,000,000 (500 ada)
954
955 MPC-03 (x - "should")
    *minPoolCost* should be set in
    line with the
956 economic cost for operating a
    pool
957
958 #### **Treasury Cut
    (treasuryCut)**
959
960 Part of the rewards mechanism
961
962 -   The treasury cut portion of
    the monetary expansion is
    transferred to
963     the treasury before any pool
    rewards are paid
964
965 -   Can be set in the range 0.0-
    1.0 (0%-100%)
966
967 ##### **GUARDRAILS**
968
969 TC-01 (y) *treasuryCut* must not
    be lower than 0.1 (10%)
```

```
1000
1001 TC-02 (y) *treasuryCut* must not
     exceed 0.3 (30%)
1002
1003 TC-03 (y) *treasuryCut* must not
     be negative
1004
1005 TC-04 (y) *treasuryCut* must not
     exceed 1.0 (100%)
1006
1007 TC-05 (\~ - no access to change
     history) *treasuryCut* must not
     be
1008 changed more than once in any 36
     epoch period (approximately 6
     months)
1009
1010 #### **Monetary Expansion Rate
     (monetaryExpansion)**
1011
1012 Part of the rewards mechanism
1013
1014 -   The monetary expansion
     controls the amount of reserves
     that is used
1015     for rewards each epoch
1016
1017 Governs the long-term
     sustainability of the Cardano
     Blockchain
1018
1019 -   The reserves are gradually
     depleted until no rewards are
     supplied
1020
1021 ##### **GUARDRAILS**
1022
1023 ME-01 (y) *monetaryExpansion*
     must not exceed 0.005
1024
1025 ME-02 (y) *monetaryExpansion*
     must not be lower than 0.001
1026
1027 ME-03 (y) *monetaryExpansion*
     must not be negative
1028
1029 ME-04 (x - \"should\")
     *monetaryExpansion* should not be
     varied by more
```

```
970
971 TC-02 (y) *treasuryCut* must not
    exceed 0.3 (30%)
972
973 TC-03 (y) *treasuryCut* must not
    be negative
974
975 TC-04 (y) *treasuryCut* must not
    exceed 1.0 (100%)
976
977 TC-05 (~ - no access to change
    history) *treasuryCut* must not
    be
978 changed more than once in any 36
    epoch period (approximately 6
    months)
979
980 #### **Monetary Expansion Rate
    (monetaryExpansion)**
981
982 Part of the rewards mechanism
983
984 -   The monetary expansion
    controls the amount of reserves
    that is used
985     for rewards each epoch
986
987 Governs the long-term
    sustainability of the Cardano
    Blockchain
988
989 -   The reserves are gradually
    depleted until no rewards are
    supplied
990
991 ##### **GUARDRAILS**
992
993 ME-01 (y) *monetaryExpansion*
    must not exceed 0.005
994
995 ME-02 (y) *monetaryExpansion*
    must not be lower than 0.001
996
997 ME-03 (y) *monetaryExpansion*
    must not be negative
998
999 ME-04 (x - "should")
    *monetaryExpansion* should not be
    varied by more
```

```
than +/- 10% in any 73-epoch period (approximately 12 months)

ME-05 (x - \"should\") *monetaryExpansion* should not be changed more than once in any 36-epoch period (approximately 6 months)

#### **Plutus Script Execution Prices (executionUnitPrices\[priceSteps/priceMemory\])**

Define the fees for executing Plutus scripts

Gives an economic return for Plutus script execution

Provides security against low-cost DoS attacks

##### **GUARDRAILS**

EIUP-PS-01 (y) *executionUnitPrices\[priceSteps\]* must not exceed 2,000 / 10,000,000

EIUP-PS-02 (y) *executionUnitPrices\[priceSteps\]* must not be lower than 500 / 10,000,000

EIUP-PM-01 (y) *executionUnitPrices\[priceMemory\]* must not exceed 2,000 / 10,000

EIUP-PM-02 (y) *executionUnitPrices\[priceMemory\]* must not be lower than 400 / 10,000
```

```
than +/- 10% in any 73-epoch period (approximately 12 months)

ME-05 (x - "should") *monetaryExpansion* should not be changed more than once in any 36-epoch period (approximately 6 months)

#### **Plutus Script Execution Prices (executionUnitPrices[priceSteps/priceMemory])**

Define the fees for executing Plutus scripts

Gives an economic return for Plutus script execution

Provides security against low-cost DoS attacks

##### **GUARDRAILS**

EIUP-PS-01 (y) *executionUnitPrices[priceSteps]* must not exceed 2,000 / 10,000,000

EIUP-PS-02 (y) *executionUnitPrices[priceSteps]* must not be lower than 500 / 10,000,000

EIUP-PM-01 (y) *executionUnitPrices[priceMemory]* must not exceed 2,000 / 10,000

EIUP-PM-02 (y) *executionUnitPrices[priceMemory]* must not be lower than 400 / 10,000
```

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 (minFeeRefScriptCoinsPerByte)

Defines the cost for using Plutus reference scripts in lovelace

GUARDRAILS

MFRS-01 (y) *minFeeRefScriptCoinsPerByte* must not exceed 1,000 (0.001 ada)

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 (minFeeRefScriptCoinsPerByte)

Defines the cost for using Plutus reference scripts in lovelace

GUARDRAILS

MFRS-01 (y) *minFeeRefScriptCoinsPerByte* must not exceed 1,000 (0.001 ada)

- This ensures that transactions can be paid for

MFRS-02 (y) *minFeeRefScriptCoinsPerByte* 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 the maximum transaction fee

2.3. Network Parameters

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

1. 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

2. Balance traffic demands for different user groups, including payment
    transactions, minters of Fungible/Non-Fungible Tokens,

- This ensures that transactions can be paid for

MFRS-02 (y) *minFeeRefScriptCoinsPerByte* 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 the maximum transaction fee

2.3. Network Parameters

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

1. 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

2. Balance traffic demands for different user groups, including payment
    transactions, minters of Fungible/Non-Fungible Tokens,

Plutus
    scripts, DeFi developers, Stake Pool Operators and voting
    transactions

Triggers for Change

Changes to network parameters may be triggered by:

1. Measured changes in traffic demands over a 2-epoch period (10 days)

2. Anticipated changes in traffic demands

3. 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

Plutus
    scripts, DeFi developers, Stake Pool Operators and voting
    transactions

Triggers for Change

Changes to network parameters may be triggered by:

1. Measured changes in traffic demands over a 2-epoch period (10 days)

2. Anticipated changes in traffic demands

3. 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.

##### **GUARDRAILS**

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

#### **Changes to Specific Network Parameters**

#### **Block Size (maxBlockBodySize)**

The maximum size of a block, in Bytes.

##### **GUARDRAILS**

MBBS-01 (y) *maxBlockBodySize* must not exceed 122,880 Bytes (120KB)

MBBS-02 (y) *maxBlockBodySize* must not be lower than 24,576 Bytes
(24KB)
```

```
- 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.

##### **GUARDRAILS**

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

#### **Changes to Specific Network Parameters**

#### **Block Size (maxBlockBodySize)**

The maximum size of a block, in bytes.

##### **GUARDRAILS**

MBBS-01 (y) *maxBlockBodySize* must not exceed 122,880 bytes (120KB)

MBBS-02 (y) *maxBlockBodySize* must not be lower than 24,576 bytes
(24KB)
```

MBBS-03a (x - \"exceptional circumstances\") *maxBlockBodySize* 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) *maxBlockBodySize* must be large enough to include at least one transaction (that is, *maxBlockBodySize* must be at least *maxTxSize*)

MBBS-05 (x - \"should\") *maxBlockBodySize* 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*

MBBS-03a (x - exceptional circumstances) *maxBlockBodySize* 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) *maxBlockBodySize* must be large enough to include at least one transaction (that is, *maxBlockBodySize* must be at least *maxTxSize*)

MBBS-05 (x - "should") *maxBlockBodySize* 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 (maxTxSize)**

The maximum size of a transaction, in Bytes.

##### **GUARDRAILS**

MTS-01 (y) *maxTxSize* must not exceed 32,768 Bytes (32KB)

MTS-02 (y) *maxTxSize* must not be negative

MTS-03 (\~ - no access to existing parameter values) *maxTxSize* must
not be decreased

MTS-04 (\~ - no access to existing parameter values) *maxTxSize* must
not exceed *maxBlockBodySize*

MTS-05 (x - \"should\") *maxTxSize* 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
```

```
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 (maxTxSize)**

The maximum size of a transaction, in bytes.

##### **GUARDRAILS**

MTS-01 (y) *maxTxSize* must not exceed 32,768 bytes (32KB)

MTS-02 (y) *maxTxSize* must not be negative

MTS-03 (~ - no access to existing parameter values) *maxTxSize* must
not be decreased

MTS-04 (~ - no access to existing parameter values) *maxTxSize* must
not exceed *maxBlockBodySize*

MTS-05 (x - "should") *maxTxSize* 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
```

```
1220
1221 MTS-06 (x - \"should\") *maxTxSize* should not exceed 1/4 of the block
1222 size
1223
1224 #### **Memory Unit Limits (maxBlockExecutionUnits\[memory\], maxTxExecutionUnits\[memory\])**
1225
1226 The limit on the maximum number of memory units that can be used by
1227 Plutus scripts, either per-transaction or per-block.
1228
1229 ##### **GUARDRAILS**
1230
1231 MTEU-M-01 (y) *maxTxExecutionUnits\[memory\]* must not exceed 40,000,000
1232 units
1233
1234 MTEU-M-02 (y) *maxTxExecutionUnits\[memory\]* must not be negative
1235
1236 MTEU-M-03 (\~ - no access to existing parameter values)
1237 *maxTxExecutionUnits\[memory\]* must not be decreased
1238
1239 MTEU-M-04 (x - \"should\") *maxTxExecutionUnits\[memory\]* should not be
1240 increased by more than 2,500,000 units in any epoch
1241
1242 MBEU-M-01 (y) *maxBlockExecutionUnits\[memory\]* must not exceed
1243 120,000,000 units
1244
1245 MBEU-M-02 (y) *maxBlockExecutionUnits\
```

```
1190
1191 MTS-06 (x - "should") *maxTxSize* should not exceed 1/4 of the block
1192 size
1193
1194 #### **Memory Unit Limits (maxBlockExecutionUnits[memory], maxTxExecutionUnits[memory])**
1195
1196 The limit on the maximum number of memory units that can be used by
1197 Plutus scripts, either per-transaction or per-block.
1198
1199 ##### **GUARDRAILS**
1200
1201 MTEU-M-01 (y) *maxTxExecutionUnits[memory]* must not exceed 40,000,000
1202 units
1203
1204 MTEU-M-02 (y) *maxTxExecutionUnits[memory]* must not be negative
1205
1206 MTEU-M-03 (~ - no access to existing parameter values)
1207 *maxTxExecutionUnits[memory]* must not be decreased
1208
1209 MTEU-M-04 (x - "should") *maxTxExecutionUnits[memory]* should not be
1210 increased by more than 2,500,000 units in any epoch
1211
1212 MBEU-M-01 (y) *maxBlockExecutionUnits[memory]* must not exceed
1213 120,000,000 units
1214
1215 MBEU-M-02 (y) *maxBlockExecutionUnits[memory]*
```

```
[memory\]* must not be negative
                                                    must not be negative
1246                                                1216
1247 MBEU-M-03 (x - \"should\")                      1217 MBEU-M-03 (x - "should")
     *maxBlockExecutionUnits\                           *maxBlockExecutionUnits[memory]*
     [memory\]* should not                              should not
1248 be changed (increased or                       1218 be changed (increased or
     decreased) by more than                            decreased) by more than
     10,000,000 units in ANY                            10,000,000 units in ANY
1249 epoch                                          1219 epoch
1250                                                1220
1251 MBEU-M-04a (x - unquantifiable)                 1221 MBEU-M-04a (x - "unquantifiable")
     The impact of any change to                        The impact of any change to
1252 *maxBlockExecutionUnits\                       1222 *maxBlockExecutionUnits[memory]*
     [memory\]* must be confirmed by                    must be confirmed by detailed
     detailed
1253 benchmarking/simulation and not                 1223 benchmarking/simulation and not
     exceed the requirements of the                     exceed the requirements of the
     block                                              block
1254 diffusion/propagation time                     1224 diffusion/propagation time
     budgets, as also impacted by                       budgets, as also impacted by
1255 *maxBlockExecutionUnits\[steps\]*               1225 *maxBlockExecutionUnits[steps]*
     and *maxBlockBodySize*. Any                        and *maxBlockBodySize*. Any
     increase                                           increase
1256 must also consider previously                   1226 must also consider previously
     agreed future requirements for                     agreed future requirements for
     the total                                          the total
1257 block size (*maxBlockBodySize*)                1227 block size (*maxBlockBodySize*)
     measured against the total block                   measured against the total block
1258 diffusion target of 3s with 95%                1228 diffusion target of 3s with 95%
     block propagation within 5s.                       block propagation within 5s.
     Future                                             Future
1259 Plutus performance improvements                1229 Plutus performance improvements
     may allow the per-block memory                     may allow the per-block memory
     limit to                                           limit to
1260 be increased, but must be                      1230 be increased, but must be
     balanced against the overall                       balanced against the overall
     diffusion limits                                   diffusion limits
1261 as specified in the previous                   1231 as specified in the previous
     sentence, and future requirements                  sentence, and future requirements
1262                                                1232
1263 MEU-M-01 (\~ - no access to                     1233 MEU-M-01 (~ - no access to
     existing parameter values)                         existing parameter values)
1264 *maxBlockExecutionUnits\                       1234 *maxBlockExecutionUnits[memory]*
     [memory\]* must not be less than                   must not be less than
1265 *maxTxExecutionUnits\[memory\]*                 1235 *maxTxExecutionUnits[memory]*
1266                                                1236
1267 #### **CPU Unit Limits                         1237 #### **CPU Unit Limits
     (maxBlockExecutionUnits\[steps\],                  (maxBlockExecutionUnits[steps],
```

```
maxTxExecutionUnits\[steps\])**
1268
1269 The limit on the maximum number
     of CPU steps that can be used by
     Plutus
1270 scripts, either per transaction
     or per-block.
1271
1272 ##### **GUARDRAILS**
1273
1274 MTEU-S-01 (y)
     *maxTxExecutionUnits\[steps\]*
     must not exceed
1275 15,000,000,000 (15Bn) units
1276
1277 MTEU-S-02 (y)
     *maxTxExecutionUnits\[steps\]*
     must not be negative
1278
1279 MTEU-S-03 (\~ - no access to
     existing parameter values)
1280 *maxTxExecutionUnits\[steps\]*
     must not be decreased
1281
1282 MTEU-S-04 (x - \"should\")
     *maxTxExecutionUnits\[steps\]*
     should not be
1283 increased by more than
     500,000,000 (500M) units in any
     epoch (5 days)
1284
1285 MBEU-S-01 (y)
     *maxBlockExecutionUnits\[steps\]*
     must not exceed
1286 40,000,000,000 (40Bn) units
1287
1288 MBEU-S-02 (y)
     *maxBlockExecutionUnits\[steps\]*
     must not be negative
1289
1290 MBEU-S-03 (x - \"should\")
     *maxBlockExecutionUnits\[steps\]*
     should not
1291 be changed (increased or
     decreased) by more than
     2,000,000,000 (2Bn)
```

```
maxTxExecutionUnits[steps])**
1238
1239 The limit on the maximum number
     of CPU steps that can be used by
     Plutus
1240 scripts, either per transaction
     or per-block.
1241
1242 ##### **GUARDRAILS**
1243
1244 MTEU-S-01 (y)
     *maxTxExecutionUnits[steps]* must
     not exceed
1245 15,000,000,000 (15Bn) units
1246
1247 MTEU-S-02 (y)
     *maxTxExecutionUnits[steps]* must
     not be negative
1248
1249 MTEU-S-03 (~ - no access to
     existing parameter values)
1250 *maxTxExecutionUnits[steps]* must
     not be decreased
1251
1252 MTEU-S-04 (x - "should")
     *maxTxExecutionUnits[steps]*
     should not be
1253 increased by more than
     500,000,000 (500M) units in any
     epoch (5 days)
1254
1255 MBEU-S-01 (y)
     *maxBlockExecutionUnits[steps]*
     must not exceed
1256 40,000,000,000 (40Bn) units
1257
1258 MBEU-S-02 (y)
     *maxBlockExecutionUnits[steps]*
     must not be negative
1259
1260 MBEU-S-03 (x - "should")
     *maxBlockExecutionUnits[steps]*
     should not
1261 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-S-01 (\~ - no access to existing parameter values)
*maxBlockExecutionUnits\[steps\]* must not be less than
*maxTxExecutionUnits\[steps\]*

#### **Block Header Size (maxBlockHeaderSize)**

The size of the block header.

##### **GUARDRAILS**

MBHS-01 (y) *maxBlockHeaderSize* must not exceed 5,000 Bytes
```

```
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-S-01 (~ - no access to existing parameter values)
*maxBlockExecutionUnits[steps]* must not be less than
*maxTxExecutionUnits[steps]*

#### **Block Header Size (maxBlockHeaderSize)**

The size of the block header.

##### **GUARDRAILS**

MBHS-01 (y) *maxBlockHeaderSize* must not exceed 5,000 bytes
```

MBHS-02 (y) *maxBlockHeaderSize* must not be negative

MBHS-03 (x - \"largest valid header\" is subject to change)

maxBlockHeaderSize must be large enough for the largest valid header

MBHS-04 (x - \"should\") *maxBlockHeaderSize* should only normally be

increased if the protocol changes

MBHS-05 (x - \"should\") *maxBlockHeaderSize* 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 adversarial actions

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

MBHS-02 (y) *maxBlockHeaderSize* must not be negative

MBHS-03 (x - largest valid header is subject to change)

maxBlockHeaderSize must be large enough for the largest valid header

MBHS-04 (x - "should") *maxBlockHeaderSize* should only normally be

increased if the protocol changes

MBHS-05 (x - "should") *maxBlockHeaderSize* 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 adversarial actions

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

Changes to Specific Technical/Security Parameters

Target Number of Stake Pools (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 based on analysis is also required when changing this parameter

- Large changes in this parameter will trigger mass redelegation events

GUARDRAILS

SPTN-01 (y) *stakePoolTargetNum* must not be lower than 250

SPTN-02 (y) *stakePoolTargetNum* must not exceed 2,000

SPTN-03 (y) *stakePoolTargetNum* must not be negative

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

Core Metrics

- Number of stake pools

- Level of decentralization

Changes to Specific Technical/Security Parameters

Target Number of Stake Pools (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 based on analysis is also required when changing this parameter

- Large changes in this parameter will trigger mass redelegation events

GUARDRAILS

SPTN-01 (y) *stakePoolTargetNum* must not be lower than 250

SPTN-02 (y) *stakePoolTargetNum* must not exceed 2,000

SPTN-03 (y) *stakePoolTargetNum* must not be negative

```
SPTN-04 (y) *stakePoolTargetNum* must not be zero

#### **Pledge Influence Factor (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
based on analysis is also required

##### **GUARDRAILS**

PPI-01 (y) *poolPledgeInfluence* must not be lower than 0.1

PPI-02 (y) *poolPledgeInfluence* must not exceed 1.0

PPI-03 (y) *poolPledgeInfluence* must not be negative

PPI-04 (x - \"should\") *poolPledgeInfluence* should not vary by more
than +/- 10% in any 18-epoch period (approximately 3 months)

#### **Pool Retirement Window (poolRetireMaxEpoch)**

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

##### **GUARDRAILS**
```

```
SPTN-04 (y) *stakePoolTargetNum* must not be zero

#### **Pledge Influence Factor (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
based on analysis is also required

##### **GUARDRAILS**

PPI-01 (y) *poolPledgeInfluence* must not be lower than 0.1

PPI-02 (y) *poolPledgeInfluence* must not exceed 1.0

PPI-03 (y) *poolPledgeInfluence* must not be negative

PPI-04 (x - "should") *poolPledgeInfluence* should not vary by more
than +/- 10% in any 18-epoch period (approximately 3 months)

#### **Pool Retirement Window (poolRetireMaxEpoch)**

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

##### **GUARDRAILS**
```

```
PRME-01 (y) *poolRetireMaxEpoch* must not be negative

PRME-02 (x - \"should\") *poolRetireMaxEpoch* should not be lower than 1

#### **Collateral Percentage (collateralPercentage)**

Defines how much collateral must be provided when executing a Plutus
script as a percentage of the normal execution cost

-   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 failed scripts

##### **GUARDRAILS**

CP-01 (y) *collateralPercentage* must not be lower than 100

CP-02 (y) *collateralPercentage* must not exceed 200

CP-03 (y) *collateralPercentage* must not be negative

CP-04 (y) *collateralPercentage* must not be zero

#### **Maximum number of collateral inputs (maxCollateralInputs)**

Defines the maximum number of inputs that can be used for
```

```
PRME-01 (y) *poolRetireMaxEpoch* must not be negative

PRME-02 (x - "should") *poolRetireMaxEpoch* should not be lower than 1

#### **Collateral Percentage (collateralPercentage)**

Defines how much collateral must be provided when executing a Plutus
script as a percentage of the normal execution cost

-   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 failed scripts

##### **GUARDRAILS**

CP-01 (y) *collateralPercentage* must not be lower than 100

CP-02 (y) *collateralPercentage* must not exceed 200

CP-03 (y) *collateralPercentage* must not be negative

CP-04 (y) *collateralPercentage* must not be zero

#### **Maximum number of collateral inputs (maxCollateralInputs)**

Defines the maximum number of inputs that can be used for
```

collateral
when executing a Plutus script

GUARDRAILS

MCI-01 (y) *maxCollateralInputs* must not be lower than 1

Maximum Value Size (maxValueSize)

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

GUARDRAILS

MVS-01 (y) *maxValueSize* must not exceed 12,288 Bytes (12KB)

MVS-02 (y) *maxValueSize* must not be negative

MVS-03 (\~ - no access to existing parameter values) *maxValueSize* must

be less than *maxTxSize*

MVS-04 (\~ - no access to existing parameter values) *maxValueSize* 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 (costModels)

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

collateral
when executing a Plutus script

GUARDRAILS

MCI-01 (y) *maxCollateralInputs* must not be lower than 1

Maximum Value Size (maxValueSize)

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

GUARDRAILS

MVS-01 (y) *maxValueSize* must not exceed 12,288 bytes (12KB)

MVS-02 (y) *maxValueSize* must not be negative

MVS-03 (~ - no access to existing parameter values) *maxValueSize* must

be less than *maxTxSize*

MVS-04 (~ - no access to existing parameter values) *maxValueSize* 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 (costModels)

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

```
1479
1480 A different cost model is required for each Plutus version. Each cost
1481 model comprises many distinct cost model values. Cost models are defined
1482 for each Plutus language version. A new language version may introduce
1483 additional cost model values or remove existing cost model values.
1484
1485 ##### **GUARDRAILS**
1486
1487 PCM-01 (x - unquantifiable) *Cost model* values must be set by
1488 benchmarking on a reference architecture
1489
1490 PCM-02 (x - primitives and language versions aren\'t introduced in
1491 transactions) The *cost model* must be updated if new primitives are
1492 introduced or a new Plutus language version is added
1493
1494 PCM-03a (\~ - no access to *Plutus cost model* parameters) *Cost model*
1495 values should not normally be negative. Negative values must be
1496 justified against the underlying cost model for the associated
1497 primitives
1498
1499 PCM-04 (\~ - no access to *Plutus cost model* parameters) A *cost model*
1500 must be supplied for each Plutus language version that the protocol
1501 supports
1502
```

```
1449
1450 A different cost model is required for each Plutus version. Each cost
1451 model comprises many distinct cost model values. Cost models are defined
1452 for each Plutus language version. A new language version may introduce
1453 additional cost model values or remove existing cost model values.
1454
1455 ##### **GUARDRAILS**
1456
1457 PCM-01 (x - "unquantifiable") *Cost model* values must be set by
1458 benchmarking on a reference architecture
1459
1460 PCM-02 (x - primitives and language versions aren't introduced in
1461 transactions) The *cost model* must be updated if new primitives are
1462 introduced or a new Plutus language version is added
1463
1464 PCM-03a (~ - no access to *Plutus cost model* parameters) *Cost model*
1465 values should not normally be negative. Negative values must be
1466 justified against the underlying cost model for the associated
1467 primitives
1468
1469 PCM-04 (~ - no access to *Plutus cost model* parameters) A *cost model*
1470 must be supplied for each Plutus language version that the protocol
1471 supports
1472
```

2.5. Governance Parameters

The overall goals when managing the governance parameters are to:

1. Ensure governance stability

2. Maintain a representative form of governance

Triggers for Change

Changes to governance parameters may be triggered by:

1. Cardano Community requests

2. Regulatory requirements

3. Unexpected or unwanted governance outcomes

4. 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

2.5. Governance Parameters

The overall goals when managing the governance parameters are to:

1. Ensure governance stability

2. Maintain a representative form of governance

Triggers for Change

Changes to governance parameters may be triggered by:

1. Cardano Community requests

2. Regulatory requirements

3. Unexpected or unwanted governance outcomes

4. 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

#### **Changes to Specific Governance Parameters**

#### **Deposit for Governance Actions (govDeposit)**

The deposit that is charged when submitting a governance action.

- Helps to limit the number of actions that are submitted

##### **GUARDRAILS**

GD-01 (y) *govDeposit* must not be negative

GD-02 (y) *govDeposit* must not be lower than 1,000,000 (1 ada)

GD-03a (y) *govDeposit* must not exceed 10,000,000,000,000 (10 million
ada)

GD-04 (x - \"should\") *govDeposit* should be adjusted in line with fiat
changes

#### **Deposit for DReps (dRepDeposit)**

The deposit that is charged when registering a DRep.

- Helps to limit the number of active DReps

##### **GUARDRAILS**
```

```
- Regulatory considerations

- Confidence in the governance system

- The effectiveness of the governance system in managing necessary
    change

#### **Changes to Specific Governance Parameters**

#### **Deposit for Governance Actions (govDeposit)**

The deposit that is charged when submitting a governance action.

- Helps to limit the number of actions that are submitted

##### **GUARDRAILS**

GD-01 (y) *govDeposit* must not be negative

GD-02 (y) *govDeposit* must not be lower than 1,000,000 (1 ada)

GD-03a (y) *govDeposit* must not exceed 10,000,000,000,000 (10 million
ada)

GD-04 (x - "should") *govDeposit* should be adjusted in line with fiat
changes

#### **Deposit for DReps (dRepDeposit)**

The deposit that is charged when registering a DRep.

- Helps to limit the number of active DReps

##### **GUARDRAILS**
```

```
DRD-01 (y) *dRepDeposit* must not be negative

DRD-02 (y) *dRepDeposit* must not be lower than 1,000,000 (1 ada)

DRD-03 (y) *dRepDeposit* must not exceed 100,000,000,000 (100,000 ada)

DRD-04 (x - \"should\") *dRepDeposit* should be adjusted in line with

fiat changes

#### **DRep Activity Period (dRepActivity)**

The period (as a whole number of epochs) after which a DRep is considered to be inactive for vote calculation purposes, if they do not
vote on any proposal.

##### **GUARDRAILS**

DRA-01 (y) *dRepActivity* must not be lower than 13 epochs (65 days)

DRA-02 (y) *dRepActivity* must not exceed 37 epochs (185 days)

DRA-03 (y) *dRepActivity* must not be negative

DRA-04 (\~ - no access to existing parameter values) *dRepActivity* must

be greater than *govActionLifetime*

DRA-05 (x - \"should\") *dRepActivity* should be calculated in human terms ( 60 days etc)
```

```
DRD-01 (y) *dRepDeposit* must not be negative

DRD-02 (y) *dRepDeposit* must not be lower than 1,000,000 (1 ada)

DRD-03 (y) *dRepDeposit* must not exceed 100,000,000,000 (100,000 ada)

DRD-04 (x - "should") *dRepDeposit* should be adjusted in line with

fiat changes

#### **DRep Activity Period (dRepActivity)**

The period (as a whole number of epochs) after which a DRep is considered to be inactive for vote calculation purposes, if they do not
vote on any proposal.

##### **GUARDRAILS**

DRA-01 (y) *dRepActivity* must not be lower than 13 epochs (65 days)

DRA-02 (y) *dRepActivity* must not exceed 37 epochs (185 days)

DRA-03 (y) *dRepActivity* must not be negative

DRA-04 (~ - no access to existing parameter values) *dRepActivity* must

be greater than *govActionLifetime*

DRA-05 (x - "should") *dRepActivity* should be calculated in human terms (60 days, etc.)
```

```
#### **DRep and SPO Governance Action Thresholds (dRepVotingThresholds\[\...\],poolVotingThresholds\[\...\])**

Thresholds on the active voting stake that is required to ratify a specific type of governance action by either DReps or SPOs.

-   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*
```

```
#### **DRep and SPO Governance Action Thresholds (dRepVotingThresholds[...],poolVotingThresholds[...])**

Thresholds on the active voting stake that is required to ratify a specific type of governance action by either DReps or SPOs.

-   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*
```

```
##### **GUARDRAILS**

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%

VT-HF-01 (y) \"Hard Fork Initiation\" action thresholds must be in the
range 51%-80%

VT-CON-01 (y) "New Constitution" action thresholds must be in the range
65%-90%

VT-CC-01 (y) "Update Committee" action thresholds must be in the range
51%-90%

VT-NC-01 (y) "No Confidence" action thresholds must be in the range
51%-75%

#### **Governance Action Lifetime (govActionLifetime)**

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

##### **GUARDRAILS**

GAL-01 (y) *govActionLifetime* must not be lower than 1 epoch (5 days)
```

```
##### **GUARDRAILS**

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%

VT-HF-01 (y) "Hard Fork Initiation" action thresholds must be in the
range 51%-80%

VT-CON-01 (y) "New Constitution" action thresholds must be in the range
65%-90%

VT-CC-01 (y) "Update Committee" action thresholds must be in the range
51%-90%

VT-NC-01 (y) "No Confidence" action thresholds must be in the range
51%-75%

#### **Governance Action Lifetime (govActionLifetime)**

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

##### **GUARDRAILS**

GAL-01 (y) *govActionLifetime* must not be lower than 1 epoch (5 days)
```

```
GAL-03 (x - \"should\") *govActionLifetime* should not be lower than 2
epochs (10 days)

GAL-02 (y) *govActionLifetime* must not exceed 15 epochs (75 days)

GAL-04 (x - \"should\") *govActionLifetime* 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) *govActionLifetime*
must be less than *dRepActivity*

#### **Maximum Constitutional Committee Term (committeeMaxTermLength)**

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

##### **GUARDRAILS**

CMTL-01a (y) *committeeMaxTermLength* must not be zero

CMTL-02a (y) *committeeMaxTermLength* must not be negative

CMTL-03a (y) *committeeMaxTermLength* must not be lower than 18 epochs
(90 days, or approximately 3 months)

CMTL-04a (y) *committeeMaxTermLength* must not exceed 293 epochs
```

```
GAL-03 (x - "should") *govActionLifetime* should not be lower than 2
epochs (10 days)

GAL-02 (y) *govActionLifetime* must not exceed 15 epochs (75 days)

GAL-04 (x - "should") *govActionLifetime* should be calibrated in
human terms (e.g., 30 days, two weeks), to allow sufficient time for voting
etc. to take place

GAL-05 (~ - no access to existing parameter values) *govActionLifetime*
must be less than *dRepActivity*

#### **Maximum Constitutional Committee Term (committeeMaxTermLength)**

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

##### **GUARDRAILS**

CMTL-01a (y) *committeeMaxTermLength* must not be zero

CMTL-02a (y) *committeeMaxTermLength* must not be negative

CMTL-03a (y) *committeeMaxTermLength* must not be lower than 18 epochs
(90 days, or approximately 3 months)

CMTL-04a (y) *committeeMaxTermLength* must not exceed 293 epochs
```

(approximately 4 years)

CMTL-05a (x - \"should\") *committeeMaxTermLength* should not exceed 220

epochs (approximately 3 years)

The minimum size of the Constitutional Committee (committeeMinSize)

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

GUARDRAILS

CMS-01 (y) *committeeMinSize* must not be negative

CMS-02 (y) *committeeMinSize* must not be lower than 3

CMS-03 (y) *committeeMinSize* 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 blocks over any 6 hour
    rolling window

All other parameter changes should be monitored

- The reversion plan should be implemented if the overall effect on

(approximately 4 years)

CMTL-05a (x - "should") *committeeMaxTermLength* should not exceed 220

epochs (approximately 3 years)

The minimum size of the Constitutional Committee (committeeMinSize)

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

GUARDRAILS

CMS-01 (y) *committeeMinSize* must not be negative

CMS-02 (y) *committeeMinSize* must not be lower than 3

CMS-03 (y) *committeeMinSize* 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 blocks over any 6 hour
    rolling window

All other parameter changes should be monitored

- The reversion plan should be implemented if the overall effect on

```
    performance, security, functionality or long-term sustainability
    is unacceptable.

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 state)

-   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 can be reverted. Additional
care must be taken when making changes to these parameters.

### **2.7. Non-Updatable Protocol Parameters**

Some fundamental protocol parameters cannot be changed by the
\"Parameter Update\" 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 Withdrawals" Actions**

"Treasury Withdrawals" actions specify the destination and amount of a
```

```
    performance, security, functionality, or long-term sustainability
    is unacceptable.

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 state)

-   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 can be reverted. Additional
care must be taken when making changes to these parameters.

### **2.7. Non-Updatable Protocol Parameters**

Some fundamental protocol parameters cannot be changed by the
"Parameter Update" 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 Withdrawals" Actions**

"Treasury Withdrawals" actions specify the destination and amount of a
```

```
number of withdrawals from the Cardano Treasury.

##### **GUARDRAILS**

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 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) A roadmap that includes the applicable period of the
treasury withdrawal must be approved by the DReps via an Info Action
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
```

```
number of withdrawals from the Cardano Treasury.

##### **GUARDRAILS**

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 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

### **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
```

```
1789 As the result of a hard fork, new updatable protocol parameters may be
1790 introduced. Guardrails may be defined for these parameters, which will
1791 take effect following the hard fork. Existing updatable protocol
1792 parameters may also be deprecated by the hard fork, in which case the
1793 guardrails become obsolete for all future changes.
1794
1795 ##### **GUARDRAILS**
1796
1797 HARDFORK-01 (\~ - no access to existing parameter values) The major
1798 protocol version must be the same as or one greater than the major
1799 version that will be enacted immediately prior to this change. If the
1800 major protocol version is one greater, then the minor protocol version
1801 must be zero
1802
1803 HARDFORK-02a (\~ - no access to existing parameter values) Unless the
1804 major protocol version is also changed, the minor protocol version must
1805 be greater than the minor version that will be enacted immediately prior
1806 to this change
1807
1808 HARDFORK-03 (\~ - no access to existing parameter values) At least one
1809 of the protocol versions (major or minor or both) must change
1810
1811 HARDFORK-04a (x) At least 85% of stake pools by active stake should have
```

```
1755 As the result of a hard fork, new updatable protocol parameters may be
1756 introduced. Guardrails may be defined for these parameters, which will
1757 take effect following the hard fork. Existing updatable protocol
1758 parameters may also be deprecated by the hard fork, in which case the
1759 guardrails become obsolete for all future changes.
1760
1761 ##### **GUARDRAILS**
1762
1763 HARDFORK-01 (~ - no access to existing parameter values) The major
1764 protocol version must be the same as or one greater than the major
1765 version that will be enacted immediately prior to this change. If the
1766 major protocol version is one greater, then the minor protocol version
1767 must be zero
1768
1769 HARDFORK-02a (~ - no access to existing parameter values) Unless the
1770 major protocol version is also changed, the minor protocol version must
1771 be greater than the minor version that will be enacted immediately prior
1772 to this change
1773
1774 HARDFORK-03 (~ - no access to existing parameter values) At least one
1775 of the protocol versions (major or minor or both) must change
1776
1777 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 Committee" actions**

"Update Committee" actions may change the size, composition or required voting thresholds for the Constitutional Committee.

##### **GUARDRAILS**

UPDATE-CC-01a (x) "Update Committee" actions must not be ratified until
```

```
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 Committee" actions**

"Update Committee" actions may change the size, composition or required voting thresholds for the Constitutional Committee.

##### **GUARDRAILS**

UPDATE-CC-01a (x) "Update Committee" 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" actions**

"New Constitution" actions change the hash of the on-chain Constitution
and the associated Guardrails Script.

##### **GUARDRAILS**

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 Confidence" actions.

##### **GUARDRAILS**

-   None

### **8. Guardrails and Guidelines on "Info" actions**

"Info" actions are not enacted on-chain. No guardrails are imposed on
```

```
Ada Holders have ratified through an on-chain governance action this
Constitution

### **6. Guardrails and Guidelines on "New Constitution" actions**

"New Constitution" actions change the hash of the on-chain Constitution
and the associated Guardrails Script.

##### **GUARDRAILS**

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 Confidence" actions.

##### **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:

-   *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:

-   *minimum fee coefficient* (*txFeePerByte*)
```

```
"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:

-   *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:

-   *minimum fee coefficient* (*txFeePerByte*)
```

```
1901 -   *minimum fee constant*
     (*txFeeFixed*)
1902
1903 -   *minimum fee per byte for
     reference scripts*
1904
     (*minFeeRefScriptCoinsPerByte*)
1905
1906 -   *delegation key lovelace
     deposit* (*stakeAddressDeposit*)
1907
1908 -   *pool registration lovelace
     deposit* (*stakePoolDeposit*)
1909
1910 -   *monetary expansion*
     (*monetaryExpansion*)
1911
1912 -   *treasury expansion*
     (*treasuryCut*)
1913
1914 -   *minimum fixed rewards cut
     for pools* (*minPoolCost*)
1915
1916 -   *minimum lovelace deposit per
     byte of serialized UTxO*
1917     (*coinsPerUTxOByte*)
1918
1919 -   *prices of Plutus execution
     units*
1920     (*executionUnitPrices\
     [priceSteps/priceMemory\]*)
1921
1922 The technical/security parameter
     group consists of:
1923
1924 -   *pool pledge influence*
     (*poolPledgeInfluence*)
1925
1926 -   *pool retirement maximum
     epoch* (*poolRetireMaxEpoch*)
1927
1928 -   *desired number of pools*
     (*stakePoolTargetNum*)
1929
1930 -   *Plutus execution cost
     models* (*costModels*)
1931
1932 -   *proportion of collateral
     needed for scripts*
1933     (*collateralPercentage*)
```

```
1867 -   *minimum fee constant*
     (*txFeeFixed*)
1868
1869 -   *minimum fee per byte for
     reference scripts*
1870
     (*minFeeRefScriptCoinsPerByte*)
1871
1872 -   *delegation key lovelace
     deposit* (*stakeAddressDeposit*)
1873
1874 -   *pool registration lovelace
     deposit* (*stakePoolDeposit*)
1875
1876 -   *monetary expansion*
     (*monetaryExpansion*)
1877
1878 -   *treasury expansion*
     (*treasuryCut*)
1879
1880 -   *minimum fixed rewards cut
     for pools* (*minPoolCost*)
1881
1882 -   *minimum lovelace deposit per
     byte of serialized UTxO*
1883     (*coinsPerUTxOByte*)
1884
1885 -   *prices of Plutus execution
     units*
1886
     (*executionUnitPrices[priceSteps/
     priceMemory]*)
1887
1888 The technical/security parameter
     group consists of:
1889
1890 -   *pool pledge influence*
     (*poolPledgeInfluence*)
1891
1892 -   *pool retirement maximum
     epoch* (*poolRetireMaxEpoch*)
1893
1894 -   *desired number of pools*
     (*stakePoolTargetNum*)
1895
1896 -   *Plutus execution cost
     models* (*costModels*)
1897
1898 -   *proportion of collateral
     needed for scripts*
1899     (*collateralPercentage*)
```

```
1934
1935 The governance parameter group
     consists of:
1936
1937 -   *governance voting
     thresholds*
     (*dRepVotingThresholds\[\...\],
1938     poolVotingThresholds\
     [\...\]*)
1939
1940 -   *governance action maximum
     lifetime in epochs*
     (*govActionLifetime*)
1941
1942 -   governance action deposit\*
     (*govActionDeposit*)
1943
1944 -   *DRep deposit amount*
     (*dRepDeposit*)
1945
1946 -   *DRep activity period in
     epochs* (*dRepActivity*)
1947
1948 -   *minimal constitutional
     committee size*
     (*committeeMinSize*)
1949
1950 -   *maximum term length (in
     epochs) for the constitutional
     committee
1951     members*
     (*committeeMaxTermLength*)
1952
1953 **APPENDIX II. SUPPORTING
     GUIDANCE**
1954 ---------------------------------
     ---
1955
1956 This Appendix II is intended to
     provide guidance in interpreting
     the
1957 Constitution and the
     Constitutional Committee shall
     consider this
1958 Appendix II as it deems relevant
     and useful in carrying out its
1959 constitutional duties.
1960
1961 ### **1. Framing Notes**
```

```
1900
1901 The governance parameter group
     consists of:
1902
1903 -   *governance voting
     thresholds*
     (*dRepVotingThresholds[...],
1904     poolVotingThresholds[...]*)
1905
1906 -   *governance action maximum
     lifetime in epochs*
     (*govActionLifetime*)
1907
1908 -   *governance action deposit*
     (*govDeposit*)
1909
1910 -   *DRep deposit amount*
     (*dRepDeposit*)
1911
1912 -   *DRep activity period in
     epochs* (*dRepActivity*)
1913
1914 -   *minimal Constitutional
     Committee size*
     (*committeeMinSize*)
1915
1916 -   *maximum term length (in
     epochs) for the Constitutional
     Committee
1917     members*
     (*committeeMaxTermLength*)
1918
1919 **APPENDIX II. SUPPORTING
     GUIDANCE**
1920 ---------------------------------
     ---
1921
1922 This Appendix II is intended to
     provide guidance in interpreting
     the
1923 Constitution and the
     Constitutional Committee shall
     consider this
1924 Appendix II as it deems relevant
     and useful in carrying out its
1925 constitutional duties.
1926
1927 ### **1. Framing Notes**
```

The Cardano Blockchain was established in 2017. In July 2020 the Cardano Blockchain was expanded to include independent block validators and in September 2024 an on-chain governance system was introduced. This Constitution outlines the rights and responsibilities of governance

actors in the decentralized system who represent the owners of ada, the governance token of the Cardano Blockchain. The Cardano Blockchain is a decentralized ecosystem of blockchain technology, smart contracts, and community governance.

actors in the decentralized system who represent the Ada Holders; ada is the governance token of the Cardano Blockchain. The Cardano Blockchain is a decentralized ecosystem of blockchain technology, smart contracts, and community governance.

In approaching this Constitution, the Cardano Community recognizes that this is not a constitution for only a blockchain but rather a constitution for a blockchain ecosystem. Accordingly, how governance actions are approved, while extremely important, is not the sole focus of this Constitution. Rather, this Constitution provides the basis and fundamental framework through which all participants in the Cardano Community can come together to govern themselves and form new approaches to human interaction and collaboration.

By necessity, this Constitution recognizes the role of and empowers the

```
Constitutional Committee,
confirms the right of the Cardano Community to
participate in collective bodies for collaboration, gives effect to
on-chain governance, and empowers DReps - including ada holders acting
directly as DReps - to act as the voice of ada holders for on-chain
voting.

The Constitution also recognizes the necessity of safeguarding access to
and the use of funds of the Cardano Blockchain treasury through the
inclusion of the Cardano Blockchain Guardrails in this Constitution.

### **2. Other Guidance**

The drafters of the Constitution, together with other participants from
the Cardano Community, have published and in the future may publish
guidance for interpreting the Constitution, including, without
limitation, a definition booklet that has been released
contemporaneously with the on-chain ratification of the Constitution. So
long as any such published guidance has been hashed to the Cardano
Blockchain pursuant to an \"Info\" action, the Constitutional Committee
shall not be precluded from considering and utilizing such guidance as
it deems appropriate.
```

```
Constitutional Committee,
confirms the right of the Cardano Community to
participate in collective bodies for collaboration, gives effect to
on-chain governance, and empowers DReps - including Ada Holders acting
directly as DReps - to act as the voice of Ada Holders for on-chain
voting.

The Constitution also recognizes the necessity of safeguarding access to
and the use of funds of the Cardano Blockchain treasury through the
inclusion of the Cardano Blockchain Guardrails in this Constitution.

### **2. Other Guidance**

The drafters of the Constitution, together with other participants from
the Cardano Community, have published and in the future may publish
guidance for interpreting the Constitution, including, without
limitation, a definition booklet that has been released
contemporaneously with the on-chain ratification of the Constitution. So
long as any such published guidance has been hashed to the Cardano
Blockchain pursuant to an "Info" action, the Constitutional Committee
shall not be precluded from considering and utilizing such guidance as
it deems appropriate.
```