

List of changes from v1.00 to v2.00

214 removals

1099 lines

+ 255 additions

1146 lines

- 1 CARDANO BLOCKCHAIN ECOSYSTEM CONSTITUTION
- 2 PREAMBLE
- 3 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.

5 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 selfgovernance by balancing decentralized decision-making with accountability and safeguarding the security of the Cardano Blockchain.

7 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-

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6

7 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 selfgovernance 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
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and the rights of those who own
ada.

8

9 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 but stand not in the way of any who wish to take another path.

8

9 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.

10

11 DEFINED TERMS

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.

13

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

15

16 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. 17 18 Cardano Community member. Means any participant, individual or organization in the Cardano Community, including the CC. 19 20 Constitutional Committee (CC). The governing body and its component elected seats charged with ensuring that applicable governance actions take effect on the Cardano Blockchain only if in alignment with the principles and provisions set forth in the Cardano Blockchain Ecosystem Constitution. 21 22 Constitutional Committee member (CC member). A person, whether an individual or organization, that serves as a member of the Constitutional Committee; 23 24 Delegated Representative (DRep). The individual or entity registered to vote with respect to on-chain governance actions for its own behalf or on behalf of other owners of ada. 25 26 Net Change Limit. Means the maximum amount or percentage by which the Cardano Treasury may not be reduced by in a given period. 27 28 Stake Pool Operator (SPO). An individual or entity that manifests intent through the signed transactions of a Stake Pool. 29 30 Stake Pool. A Stake Pool Operator's Block producing node, identified by a unique Stake Pool. 30 Deperator's Block producing node, identified by a unique Stake Pool. 31 Dy which aggregates applicable Delegator stake, forges and validates Blocks, and facilitates contributions of the SPO to the Cardano Blockchain's security,		
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		contributions of the SPO to the

decentralization, consensus mechanism, and governance process. 31

> 32 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

11 ARTICLE I. CARDANO BLOCKCHAIN TENETS AND GUARDRAILS

13 These below Tenets shall guide

Community, including the

all participants of the Cardano

Constitutional Committee, and

be evaluated in accordance with

the below Tenets appear is not

these Tenets. The order in which

intended to represent a priority

34 ARTICLE I. CARDANO BLOCKCHAIN TENETS AND GUARDRAILS

12 Section 1

among Tenets.

proposed governance actions shall

35 Section 1 Guiding Tenets

36 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.

14

10

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

37

33

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

16

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

39

41

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

18

20

19 TENET 3 Anyone desiring to develop and deploy applications on the Cardano Blockchain shall not unreasonably be prevented from developing and deploying such applications as intended.

21 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.

develop and deploy applications on the Cardano Blockchain shall not unreasonably be prevented from developing and deploying such applications as intended.

42 TENET 3 Anyone desiring to

43

44 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.

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

24

25 TENET 6 The Cardano Blockchain shall not unreasonably impede interoperability.

26

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

28

29 TENET 8 The Cardano Blockchain shall not unreasonably spend resources.

30

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

32

TENET 10 Financial stability shall be maintained and the total supply of ada shall not exceed 45,000,000,000 (45,000,000,000,000,000 lovelace).

34

35 Section 2

operate in accordance with the Guardrails for the Cardano Blockchain as set forth in the Cardano Blockchain Guardrails Appendix to this Constitution. The Cardano Community may from

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

47

45

48 TENET 6 The Cardano Blockchain shall not unreasonably impede interoperability.

49

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

51

52 TENET 8 The Cardano Blockchain shall not unreasonably spend resources.

53

54 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.

55

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).

57

- 58 Section 2 Implementation of Guardrails
- 59 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

time to time digitally codify certain Guardrails such that the Guardrails are directly programmed and implemented on the Cardano Blockchain using on-chain Guardrails Scripts or built-in ledger rules.

Guardrails are directly programmed and implemented on the Cardano Blockchain using on-chain Guardrails Script or built-in ledger rules.

37

38 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 Constitutional Committee shall seek to reconcile such inconsistencies through the encouragement of an appropriate on-chain governance action.

60

61 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.

39

- 40 ARTICLE II. THE CARDANO
 BLOCKCHAIN COMMUNITY
- 41 Section 1
- 42 No formal membership shall be required to use, participate in and benefit from the Cardano Blockchain. Instead, all owners of ada, all developers of, all those building on, and all those otherwise supporting, maintaining or using the Cardano Blockchain are considered to be participants in the Cardano Community and are therefore recognized as beneficiaries of the Cardano Blockchain ecosystem. All participants in the Cardano Community are accordingly beneficiaries of this Constitution, entitled to its rights, privileges and protections and, as such, are

62

- 63 ARTICLE II. COMMUNITY AND GOVERNANCE
- 64 Section 1 The Cardano Community
- 65 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.

expected to support and uphold this Constitution.

43

44 Section 2

Participants in the Cardano
Community who own ada are
entitled to access and
participate in the on-chain
decision-making processes of the
Cardano Blockchain ecosystem,
including voting and taking part
in on-chain governance actions
regarding the Cardano Blockchain.

46

47 Section 3

The Cardano Community has a responsibility to maintain the integrity of the Cardano Blockchain ecosystem by following this Constitution, operating the Cardano Blockchain, participating in Cardano Blockchain governance activities, and resolving disputes in a fair and transparent manner.

49

50 Section 4

The Cardano Community is entitled and encouraged through the provisions of this Constitution to collaborate in developing, maintaining and building applications for the Cardano Blockchain, and to form temporary and permanent organizations, associations and other entities as the Cardano Community deems desirable or appropriate in

66

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

68

69 Section 2 Participation Rights of Ada Holders

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.

71

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

support of the Cardano Blockchain ecosystem.

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53 ARTICLE III. PARTICIPATORY AND DECENTRALIZED GOVERNANCE

54 Section 1

55 The Cardano Blockchain shall be governed by a decentralized, onchain governance model, utilizing, to the extent possible and beneficial, smart contracts and other blockchain based tools to facilitate decision-making and ensure transparency. On-chain voting for governance actions shall follow the process outlined in this Constitution, including the Cardano Blockchain Guardrails Appendix. On-chain governance actions shall be effected through a collective decision-making process, with specific consensus threshold requirements, as required by the Cardano Blockchain Guardrails.

56

57 Section 2

Three independent governance bodies shall participate in voting for on-chain governance actions to provide checks and balances for the Cardano Blockchain, consisting of Delegated Representatives (DReps), Stake Pool Operators (SPOs) and the Constitutional Committee (CC).

59

60 Section 3

All owners of ada shall have the right to vote in on-chain governance decision-making processes, as provided for in

73

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

75

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

77

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

this Constitution and the Cardano Blockchain Guardrails Appendix.
All owners of ada shall have the right to propose changes to the governance structure of the Cardano Blockchain ecosystem in accordance with the Guardrails.
Owners of ada who use third-party custodians or other designees to hold their ada, may authorize or may withhold authorization for, such third-parties to vote on their behalf.

62

63 Section 4

64 A special form of on-chain governance action, an "Info" action, exists to allow the Cardano Community to propose potential future on-chain governance actions and to allow community sentiment to be gauged without committing to any onchain change to the Cardano Blockchain. Such "Info" actions have no on-chain effect other than to record such "Info" actions on the Cardano Blockchain. In accordance with Article VII Section 4, "Info" actions shall also be used in connection with proposed Cardano Blockchain ecosystem budgets and Cardano Blockchain treasury withdrawals.

79

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.

65

66 Section 5

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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.

67 In order to promote transparency in the process of on-chain governance, prior to being recorded or enacted on-chain, all proposed governance actions are expected to follow a standardized and legible format including a URL and hash of all documented off-chain content to the Cardano Blockchain. Sufficient rationale shall be provided to justify the requested change to the Cardano Blockchain. The rationale shall include, at a minimum, a title, abstract, reason for the proposal, and relevant supporting materials.

68

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

83

- 84 Section 3 Decentralized
 Governance Framework
- 85 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.

70

"Hard Fork Initiation" and
"Protocol Parameter Change"
governance 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. On-chain
governance actions should address
their expected impact on the
Cardano Blockchain ecosystem.

86

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.

72

All owners of ada shall have the right to ensure that the process for participating in, submitting and voting on on-chain governance actions is open and transparent

88

89 Section 4: Delegated Representatives

and is protected from undue influence and manipulation.

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

74

75 Section 6

The Cardano Community is expected to support the creation, maintenance and ongoing administration of off-chain governance processes as may be necessary to give effect to this Constitution and to ensure that there is awareness of and an opportunity to debate and shape all future governance actions for the Cardano Blockchain.

92 DReps may vote on all types of

governance actions.

93

91

77

78 ARTICLE IV. THE CARDANO
BLOCKCHAIN ECOSYSTEM BUDGET

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.

79 Section 1

80 Any participant in the Cardano Community may propose a Cardano Blockchain ecosystem budget at any time. The Cardano Community is expected to periodically propose one or more budgets for the ongoing operation, maintenance and future development of the Cardano Blockchain ecosystem and for covering other costs related to the implementation, administration and maintenance of the decentralized, on-chain governance processes provided for in this Constitution. The Cardano Community may propose one aggregate budget or multiple budgets for the Cardano Blockchain ecosystem. Such budgets are expected to cover not less than a period of 73 epochs

(approximately one calendar year) but nothing shall prevent the Cardano Community from proposing budgets for shorter or longer time periods. All owners of ada are expected to periodically approve one or more Cardano Blockchain ecosystem budgets through an on-chain "Info" action. As provided in Section 3 of this Article IV, withdrawals may be made from the Cardano Blockchain treasury as necessary from time to time to give effect to the Cardano Blockchain ecosystem budget or budgets then in effect. Existing budgets may be amended following the same process as provided in this Section 1.

81

82 Section 2

83 Development of Cardano Blockchain ecosystem budgets and the administration of such budgets shall utilize, to the extent possible and beneficial, smart contracts and other blockchain based tools to facilitate decision-making and ensure transparency. Cardano Blockchain budgets shall specify a process for overseeing use of funds from Cardano Blockchain treasury withdrawals including designating one or more administrators who shall be responsible for such oversight.

84

85 Section 3

86 Withdrawals from the Cardano
Blockchain treasury that would
cause the Cardano Blockchain
treasury balance to violate the
then applicable net change limit
shall not be permitted. No

95

OReps 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.

97

98 Section 5: Stake Pool Operators

99 Stake Pool Operators shall vote on the following governance actions: (i) Motion of No Confidence, (ii) Update Committee/Threshold, (iii) Hard Fork Initiation, (iv) Protocol withdrawals from the Cardano
Blockchain treasury shall be
permitted unless such withdrawals
have been authorized and are
being made pursuant to a budget
for the Cardano Blockchain that
is then in effect as required by
the Cardano Blockchain Guardrails
Appendix, and which has not been
determined by the Constitutional
Committee to be unconstitutional.

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.

87

88 Section 4

Any governance action requesting ada from the Cardano Blockchain treasury shall require an allocation of ada as a part of such funding request to cover the cost of periodic independent audits and the implementation of oversight metrics as to the use of such ada. Contractual obligations governing the use of ada received from the Cardano Blockchain treasury pursuant to a Cardano Blockchain ecosystem budget shall include dispute resolution provisions.

100

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

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91 Section 5

92 Any ada received from a Cardano Blockchain treasury withdrawal, so long as such ada is being held directly or indirectly by an administrator prior to further disbursement, must be kept in one or more separate accounts that

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Initiation", "No Confidence",
"Update Committee", and
"Parameter Update" governance
actions that affect securitycritical parameters set forth
under Parameters that are
Critical to the Operation of the
Blockchain in Section 2.1 of the
Cardano Blockchain Guardrails
Appendix.

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.

93

94 ARTICLE V. DELEGATED
REPRESENTATIVES

95 Section 1

96 In order to participate in governance actions, owners of ada may register as DReps and directly vote on such governance actions or may delegate their voting rights to other registered DReps who shall vote on their behalf.

97

98 Section 2

Any owner of ada shall have the option to register as a DRep.

Owners of ada shall be allowed to delegate their voting stake to one or more registered DReps, including themselves. DReps may be individuals or coordinated groups. Owners of ada who use third-party custodians or other designees to hold their ada, may authorize, or may withhold

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105 Section 6 Governance Action Standards

106 To ensure transparency in onchain 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.

107

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

authorization for, such thirdparties to delegate the voting
rights of the ada owner to
registered DReps on the owner's
behalf. DReps are entitled to
cast votes directly for on-chain
governance actions and represent
those ada owners delegating their
voting rights to them. DRep
voting thresholds are set forth
in the Cardano Blockchain
Guardrails Appendix.

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This voting system shall enshrine a liquid democracy model where owners of ada can seamlessly select among DReps, register as a DRep, and withdraw or change their delegation at any time.

102

103 Section 3

DReps who are representing delegators are expected to periodically adopt, and update as they deem appropriate, codes of conduct governing their activities as DReps and make such codes of conduct publicly available. DReps are encouraged to include ethical guidelines in their codes of conduct.

105

106 Section 4

The Cardano Community is expected to support the creation, maintenance and ongoing administration of tools to enable owners of ada to explore and evaluate DRep candidates, access and evaluate DRep codes of

109

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

111

"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.

113

114 Section 7 Treasury Withdrawal
Governance Action Standards

115 A Treasury withdrawal governance action must meet all of the following requirements:

conduct and select DReps on such criteria as they deem relevant.

108

109 Section 5

110 DReps who are representing delegators may be compensated for their efforts. DReps shall ensure that any compensation received in connection with their activities as a DRep is disclosed.

111

112 Section 6

DReps shall not pay compensation to an ada owner or to an owner's designee in exchange for being appointed a DRep by such ada owner or by its designee or for voting on behalf of such ada owner or its designee.

114

115 ARTICLE VI. STAKE POOL OPERATORS

116 Section 1

117 SPOs shall have a specific role in approving critical on-chain governance actions that require additional oversight and

116

117 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.

118

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.

120

121 A Net Change Limit must be set.

Treasury withdrawals must not
exceed the Net Change Limit for
that period.

independence, voting separately and independently from DReps as set forth in the Cardano Blockchain Guardrails Appendix. SPOs shall participate in hard fork initiation processes as the operators of the nodes that participate in Cardano Blockchain's consensus mechanism.

118

119 Section 2

120 SPOs shall act as a check on the power of the Constitutional Committee under exceptional circumstances by separately voting on "Motion of no confidence" and "Update committee/threshold and/or term" governance actions, and on "Parameter Update" governance actions that affect securitycritical parameters set forth under Parameters that are Critical to the Operation of the Blockchain in Section 2.1 of the Cardano Blockchain Guardrails Appendix.

121

122 Section 3

123 SPOs are encouraged to periodically adopt, and update as they deem appropriate, codes of conduct governing their activities as SPOs and make such codes of conduct publicly available. SPOs are encouraged to include ethical guidelines in their codes of conduct.

124

125 Section 4

122

123 All treasury withdrawal governance actions shall specify a process for oversight of use of funds received from the Cardano Treasury.

124

125 For Treasury Withdrawal Recipients requesting more than 1,000,000 ada during any two (2) year period, the following additional requirements must all be met:

126

127 Treasury withdrawal recipients shall appoint professional,

Owners of ada who are both SPOs and acting as DReps shall publicly disclose that they are participating in on-chain governance actions in both such capacities prior to exercising any on-chain governance rights.

independent auditors to conduct an audit and provide a report of treasury recipients' use of such funds received from the treasury, which shall be made available to the Cardano Community on no less than an annual basis.

127

128 ARTICLE VII. CONSTITUTIONAL COMMITTEE

129 Section 1

130 A Constitutional Committee 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. The Constitutional Committee shall comprise a set of owners of ada that is collectively responsible for ensuring that on-chain governance actions prior to enactment onchain, are constitutional. Except as otherwise provided in Section 4 of this Article VII, the Constitutional Committee shall be limited to voting on the constitutionality of governance actions to be enacted on-chain. Constitutional Committee members are expected to have appropriate expertise to carry out their required responsibilities, considering their past contributions and involvement in the Cardano Blockchain ecosystem.

128

129 Treasury withdrawal governance actions shall make provision for the costs of such an audit.

131

132 Section 2

130

131 Treasury withdrawal governance actions shall designate one or more administrators responsible for monitoring how the funds are

shall be composed of such number of members sufficient to assure the ongoing integrity of the Cardano Blockchain as determined from time to time by owners of ada. The minimum and maximum number of members of the Constitutional Committee shall be consistent with the minimum and maximum number of members as set forth in the Cardano Blockchain Guardrails Appendix.

used, and ensuring the deliverables are achieved as set out in Section 7, paragraph 1 above.

134

Committee shall serve such term lengths as shall be determined from time to time by owners of ada as consistent with the minimum and maximum term lengths as set forth in the Cardano Blockchain Guardrails Appendix. To assure continuity in the operation of the Constitutional Committee, the terms for Constitutional Committee members shall be staggered.

132

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.

136

137 Section 3

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

134

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

139

140 Section 4

141 No governance action, other than
a "Motion of no confidence," or
"Update Constitutional
Committee/threshold and/or term"

136

137 ARTICLE III. CONSTITUTIONAL
COMMITTEE

138 Section 1 Role and Scope

may be implemented on-chain unless a requisite percentage of the members of the Constitutional Committee as specified by the Guardrails shall have first determined and affirmed through an on-chain action that such proposal does not violate this Constitution. Each Constitutional Committee member shall have one vote.

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.

142

143 Because "Info" actions have no on-chain effect and, accordingly, are neither constitutional nor unconstitutional, Constitutional Committee members may not prevent "Info" actions from being recorded on-chain. Members of the Constitutional Committee may nevertheless record a vote onchain regarding an "Info" action in order to express their view on such "Info" action, including whether the suggested course of action proposed in such "Info" action, would be, in the view of such member, unconstitutional if it were to be enforced by on141 Each CC member shall have one vote.

140

142

144

144

chain mechanisms.

145 In the case of "Info" actions
that propose a Cardano Blockchain
ecosystem budget, Constitutional
Committee members shall record a
vote on-chain that sets forth
their opinion as to whether the
proposed budget, if it were to be
implemented in the form contained
in the "Info" action, would
violate this Constitution.

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.

146

In the case of "Info" actions that propose a withdrawal from

145 The CC shall be limited to voting on the constitutionality of

the Cardano Blockchain treasury
pursuant to a previously approved
budget, Constitutional Committee
members shall record a vote onchain that sets forth their
opinion as to whether such
proposed withdrawal, if made in
accordance with such "Info"
action, would violate this
Constitution.

governance actions, including any proposed or contemplated actions contained within Info actions.

148

149 Section 5

150 The Constitutional Committee 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 Constitutional Committee must be reinstated or replaced using the "Update committee/threshold" governance action before any other on-chain governance action, other than "Info" actions, may go forward. During a state of noconfidence, "Info" actions other than "Info" actions relating to budget proposals or treasury withdrawal proposals, may continue to be recorded on-chain.

146

147 Section 2 Composition and Terms

148 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.

151

152 If a member of the Constitutional Committee is not carrying out its responsibilities as required by this Constitution, as so determined by a requisite percentage as specified by the Guardrails of SPOs and DReps, voting separately pursuant to an "Update Constitutional Committee/threshold and/or term" governance action, such member shall be removed from the Constitutional Committee upon the implementation of the governance action. Thereafter, an election shall be held as soon as practical to replace the member so removed.

149

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

154 In the event of a "Motion of no confidence" governance action to remove all members of the Constitutional Committee at the same time, that is approved by a requisite percentage as specified by the Guardrails of DReps and SPOs, upon implementation of the governance action, the Constitutional Committee shall be considered to be a state of noconfidence until such time as an election has been held either to reinstate the existing Constitutional Committee members in whole or in part, or to elect new Constitutional Committee members.

152 Section 3 Election Process, No Confidence and Removal

153 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.

155

156 Section 6

154

157 Constitutional Committee

processes shall be transparent.

The Constitutional Committee

shall publish each decision. When

voting that a governance action

proposed to be executed on-chain

is unconstitutional, the

Constitutional Committee

collectively, or each member of

the Constitutional Committee

casting such a vote separately,

155 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.

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 given proposal. Internal deliberations among members of the Constitutional Committee, prior to casting votes, are not required to be publicly disclosed. 156 159 The Constitutional Committee 157 In the event of a vote of no confidence or the removal of some shall operate pursuant to a code of conduct periodically adopted CC members by "Update Committee" action, an election shall be held and published by the Constitutional Committee. The as soon as practical. Constitutional Committee is encouraged to include ethical guidelines in its code of conduct. The Constitutional Committee shall periodically adopt and publish such policies and procedures as the Constitutional Committee shall deem necessary in carrying out its duties. 158 161 Section 7 159 Section 4 Transparency and Conduct 162 The Cardano Community is expected 160 CC processes shall be to support the creation, transparent, and the CC shall publish each decision. maintenance and ongoing administration of tools as may be necessary and appropriate for the Constitutional Committee to perform its required functions. 161

164 Section 8

158

160

163

162 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 given proposal.

165 Constitutional Committee members may be compensated for their efforts as members of the Constitutional Committee. Constitutional Committee members shall ensure that any compensation received in connection with their activities as a member is disclosed. Budgets approved for the Cardano Blockchain ecosystem may include allocations from the Cardano Blockchain treasury sufficient to compensate Constitutional Committee members in such amounts as may be approved from time to time by ada owners. Cardano Blockchain ecosystem budgets shall provide for periodic administrative costs of the Constitutional Committee in such amounts as requested from time to time by the Constitutional Committee and as approved by ada owners. 166 163 167 Section 9 164 CC members may be compensated for their efforts as members and shall ensure that any compensation received in connection with such activities is disclosed in a timely manner through relevant governance communication channels. 168 Constitutional Committee members who are also acting as DReps, as SPOs, or both, shall publicly disclose that they are participating in on-chain governance actions in more than one such capacity prior to voting with respect to on-chain governance actions. 169 170 ARTICLE VIII. AMENDMENT PROCESS 171 Section 1 172 This Constitution should be treated as a living document. Technical advancements, changes

in the desires, needs and expectations of the Cardano

Community, and unforeseen circumstances may give rise to the need in the future to amend this Constitution. The Cardano Community is encouraged to periodically review and debate its provisions, and when so desired, come together in such forums as the Cardano Community may deem appropriate, to propose amendments to this Constitution. Amendments may be made as provided in this Article VIII.

173

174 Section 2

in the Cardano Blockchain
Guardrails Appendix, amendments
to this Constitution, including
to the Cardano Blockchain
Guardrails Appendix, shall be
approved by a collective
decision-making process,
requiring an on-chain governance
action by owners of ada
satisfying a threshold of no less
than 65% of the then active
voting stake.

165

166 ARTICLE IV. AMENDMENT PROCESS

167 Section 1 Amendment Rules

168 Amendments to this Constitution, including amendments to the Cardano Blockchain Guardrails Appendix, shall require approval through a collective decisionmaking process, by means of an on-chain governance action supported by at least 65% of the then active voting stake, unless a different threshold is specifically set forth in the Cardano Blockchain Guardrails Appendix for the amendment of a particular Guardrail, in which case that specified threshold shall apply.

176

177 Section 3

178 If the Cardano Blockchain

Guardrails Appendix sets forth an
amendment threshold for a

169

170 APPENDIX I. CARDANO BLOCKCHAIN GUARDRAILS

Guardrail that is different than the amendment threshold contained in Section 2 of this Article VIII, then the threshold set forth in the Cardano Blockchain Guardrails Appendix for such Guardrail shall apply.

179

- 180 APPENDIX I: CARDANO BLOCKCHAIN GUARDRAILS
- 181 1. Introduction
- 182 To implement Cardano Blockchain on-chain governance, it is necessary to establish sensible Guardrails that will enable the Cardano Blockchain to continue to operate in a secure and sustainable way.

183

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, measurement and
governance objectives.

185

These Guardrails are designed to avoid unexpected 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.

187

188 These Guardrails apply only to the Cardano Blockchain Layer 1

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175

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.

177

178 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.

189

190 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.

191

192 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, in some circumstances,
require them to be tightened) in
due course.

193

194 Additional Guardrails may also be needed where, for example, new protocol parameters are introduced.

195

196 Amending, Adding or Deprecating Guardrails

197 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

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179

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amended, the existing Guardrail will be deprecated and a new label will be used in this Appendix. Similarly, if a Guardrail is completely 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.

198

199 Terminology and Guidance

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188

189 Terminology and Guidance

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

191

192 Cardano Blockchain. The decentralized, public, peer-topeer, 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 5f20df933584822601f9e3f8c024eb5eb 252fe8cefb24d1317dc3d432e940ebb. as forged on 2017-09-23 21:44:51 UTC on the Cardano Network.

193

194 Block. A container of data produced by a Stake Pool that includes, at minimum, a header. Block production and Block forging are used interchangeably.

195

196 Protocol. The algorithms, rules, and procedures that govern the exchange of information on the Cardano Blockchain.

197

198 Protocol Parameters, Protocol settings that define how the Cardano Blockchain functions; modifiable through applicable governance processes. 199 200 Slot. The smallest denomination of time nested within an Epoch. 201 202 Epoch. A Protocol-determined interval characterized by a fixed number of Slots. Each Slot's duration and sequence are governed by the blockchain's consensus mechanisms and are associated with a universal timestamp defined in UTC. It is used for operations including governance voting, Block production leadership determination, rewards calculation, and Hard Forks. 203 204 lovelace. The smallest unit of value for the native cryptocurrency of the Cardano Blockchain, utilized for the network's security and governance. It is distinguished from other native tokens by its lack of a policy ID and policy name. 205 206 ada. A superunit of lovelace, with 1 ada equal to 1,000,000 lovelace. 207 208 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. 209 210 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.

211

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.

213

214 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.

215

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

217

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

219

220 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 quardrails 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.

221

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.

223

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

225

226 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.

227

228 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). Triggers a non-backwards compatible upgrade of the network; requires a prior software upgrade.
231 232 Protocol Parameter Changes governance action ("Parameter Changes" action or "Parameter Update" action). Any change to one or more updatable protocol parameters, excluding changes to major protocol versions ("hard forks").
233 234 Treasury Withdrawals governance action ("Treasury Withdrawals" action). Withdrawals from the treasury.
235 236 Info action ("Info" action). An action that has no effect on-chain, other than an on-chain record.
237 238 Cardano Blockchain Treasury, Cardano Treasury, or Treasury. A supply of ada controlled by the Protocol of the Cardano Blockchain; collected from transaction fees, reserves, and other designated sources. Withdrawals from this supply of ada are subject to the processes and restrictions set forth in the Cardano Blockchain Ecosystem Constitution.
239 240 Cardano Blockchain Ecosystem. The collective ecosystem comprising the Cardano Blockchain, the Cardano Community, and the tooling and infrastructure utilized by the Cardano Community to support the Cardano Blockchain in alignment with the shared principles and objectives set forth in the Cardano Blockchain Ecosystem Constitution.
241

200 Should/Should not. Where this Appendix says that a value "should not" be set below or above some value, this means that the Guardrail is a recommendation or guideline, and the specific value could be open to discussion or alteration by a suitably expert group recognized by the Cardano Community in light of experience with the Cardano Blockchain governance system or the operation of the Cardano Blockchain.

201

Appendix says that a value "must" or "must not" be set below or above some value, this means that the Guardrail is a requirement that will be enforced by Cardano Blockchain ledger rules, types or other built—in mechanisms where possible, and that if not followed could cause a protocol failure, security breach or other undesirable outcome.

203

204 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.

205

206 Performance analysis. Performance analysis refers to projecting theoretical performance,

242 Expected. A reasonable presumption that the identified action, although not mandatory, will occur.

243

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249

250 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.

207

208 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.

209

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.

211

212 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

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.

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256 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.

213

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

215

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

217

218 Severity 2 is a major incident or issue with significant impact to the security, performance, functionality or long-term sustainability of the Cardano Blockchain network

219

220 Severity 3 is a minor incident or
 issue with low impact to the
 security, performance,
 functionality or long-term
 sustainability of the Cardano
 Blockchain network

221

Planned development such as new mechanisms for out of memory storage may impact block diffusion or other times. When changing parameters, it is necessary to consider these future performance requirements as well as the current operation of the Cardano Blockchain. Until development is complete, the requirements will be conservative but may then be relaxed to account for actual timing behavior.

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.

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263

264 Severity 3 is a minor incident or issue with low impact to the security, performance, functionality or sustainability of the Cardano Blockchain network

265

Planned development such as new mechanisms for out of memory storage may impact block diffusion or other times. When changing parameters, it is necessary to consider these future performance requirements as well as the current operation of the Cardano Blockchain. Until development is complete, the requirements will be conservative but may then be relaxed to account for actual timing behavior.

- 224 Automated Checking ("Guardrails Script")
- 225 A script hash is associated with the Constitution hash when a New Constitution or Guardrails Script governance action is enacted. It acts as an additional safeguard to the ledger rules and types, filtering non-compliant governance actions.

226

227 The Guardrails Script only affects two types of governance actions:

228

229 Parameter Update actions, and

230

231 Treasury Withdrawal actions.

232

233 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.

234

235 Symbol and Explanation

236

237 (y) The Guardrail Script can be used to enforce the Guardrail

- 238 (x) The Guardrail Script cannot be used to enforce the Guardrail
- 239 (~ reason) The Guardrail Script cannot be used to enforce the Guardrail for the reason given, but future ledger changes could enable this.

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

268 Automated Checking ("Guardrails Script")

269 A script hash is associated with the Constitution hash when a New Constitution or Guardrails Script governance action is enacted. It acts as an additional safeguard to the ledger rules and types, filtering non-compliant governance actions.

270

271 The Guardrails Script only affects two types of governance actions:

272

273 "Parameter Update" actions, and

274

275 "Treasury Withdrawal" actions.

276

277 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.

278

279 Symbol and Explanation

280

281 (y) The Guardrail Script can be used to enforce the Guardrail

282

283 (x) The Guardrail Script cannot be used to enforce the Guardrail

284

285 (~ - reason) The Guardrail Script cannot be used to enforce the Guardrail for the reason given, but future ledger changes could enable this.

286

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

241

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

243

244 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.

245

246 2. Guardrails and Guidelines on Protocol Parameter Update Actions

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

248

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

250

251 GUARDRAILS

252 PARAM-01 (y) Any protocol parameter that is not explicitly named in this document must not be changed by a Parameter update governance action

253

254 PARAM-02a (y) Where a protocol parameter is explicitly listed in this document but no checkable Guardrails are specified, the Guardrails Script must not impose any constraints on changes to the parameter. Checkable Guardrails are shown by a (y)

255

256 2.1. Critical Protocol Parameters

288

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

290

291 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.

292

293 2. Guardrails and Guidelines on "Parameter Update" actions

294 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.

295

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

297

298 GUARDRAILS

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

300

301 PARAM-02a (y) Where a protocol parameter is explicitly listed in this document but no checkable Guardrails are specified, the Guardrails Script must not impose any constraints on changes to the parameter. Checkable Guardrails are shown by a (y)

302

303 2.1. Critical Protocol Parameters

237	critical from a security point of view.	304	critical from a security point of view.
258		305	
259	Parameters that are Critical to	306	Parameters that are Critical to
	the Operation of the Blockchain		the Operation of the Blockchain
260	maximum block body size	307	maximum block body size
	(maxBlockBodySize)		(maxBlockBodySize)
261		308	
262	maximum transaction size	309	maximum transaction size
	(maxTxSize)		(maxTxSize)
263		310	
264	maximum block header size	311	maximum block header size
	(maxBlockHeaderSize)		(maxBlockHeaderSize)
265		312	
266	maximum size of a serialized	313	maximum size of a serialized
	asset value (maxValueSize)		asset value (maxValueSize)
267		314	
268	maximum script execution/memory	315	maximum script execution/memory
	units in a single block		units in a single block
	<pre>(maxBlockExecutionUnits[steps/mem</pre>		<pre>(maxBlockExecutionUnits[steps/mem</pre>
	ory])		ory])
269		316	
270	minimum fee coefficient	317	minimum fee coefficient
	(txFeePerByte)		(txFeePerByte)
271		318	
272	minimum fee constant (txFeeFixed)	319	<pre>minimum fee constant (txFeeFixed)</pre>
273		320	
274	minimum fee per byte for	321	minimum fee per byte for
	reference scripts		reference scripts
	<pre>(minFeeRefScriptCoinsPerByte)</pre>		<pre>(minFeeRefScriptCoinsPerByte)</pre>
275		322	
276	minimum lovelace deposit per byte	323	minimum lovelace deposit per byte
	of serialized UTx0		of serialized UTxO
	(utxoCostPerByte)		(utxoCostPerByte)
277		324	
278	J	325	governance action deposit
	(govDeposit)		(govDeposit)
279		326	
280	GUARDRAILS	327	GUARDRAILS
281	PARAM-03a (y) Critical protocol	328	PARAM-03a (y) A parameter that is
	parameters require an SPO vote in		critical to the operation of the
	addition to a DRep vote: SPOs		blockchain require an SPO vote in
	must say "yes" with a collective		addition to a DRep vote: SPOs
	support of more than 50% of all		must say "yes" with a collective
	active block production stake.		support of more than 50% of all
	This is enforced by the		active block production stake.
	Guardrails on the stake pool		This is enforced by the
	voting threshold.		Guardrails on the stake pool
			voting threshold.

PARAM-04a (x) At least 3 months should normally pass between the publication of an off-chain proposal to change a critical protocol parameter and the submission of the corresponding on-chain governance action. This Guardrail may be relaxed in the event of a Severity 1 or Severity 2 network issue following careful technical discussion and evaluation.

284

- 285 Parameters that are Critical to the Governance System
- 286 delegation key lovelace deposit (stakeAddressDeposit)

287

288 pool registration lovelace
 deposit (stakePoolDeposit)

289

290 minimum fixed rewards cut for
pools (minPoolCost)

291

292 DRep deposit amount (dRepDeposit)

293

294 minimal Constitutional Committee size (committeeMinSize)

295

296 maximum term length (in epochs) for the Constitutional Committee members (committeeMaxTermLength)

297

- 298 GUARDRAILS
- 299 PARAM-05a (y) DReps must vote "yes" with a collective support of more than 50% of all active voting stake. This is enforced by the Guardrails on the DRep voting thresholds.

300

301 PARAM-06a (x) At least 3 months should normally pass between the publication of an off-chain proposal to change a parameter that is critical to the governance system and the submission of the corresponding on-chain governance action. This Guardrail may be relaxed in the

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.

331

- 332 Parameters that are Critical to the Governance System
- 333 delegation key lovelace deposit
 (stakeAddressDeposit)

334

335 pool registration lovelace
 deposit (stakePoolDeposit)

336

337 minimum fixed rewards cut for
pools (minPoolCost)

338

339 DRep deposit amount (dRepDeposit)

340

341 minimal Constitutional Committee
 size (committeeMinSize)

342

343 maximum term length (in epochs) for the Constitutional Committee members (committeeMaxTermLength)

344

- 345 GUARDRAILS
- 346 PARAM-05a (y) DReps must vote "yes" with a collective support of more than 50% of all active voting stake. This is enforced by the Guardrails on the DRep voting thresholds.

347

348 PARAM-06a (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 governance system and the submission of the corresponding on-chain governance action. This Guardrail may be relaxed in the

event of a Severity 1 or Severity 2 network issue following careful technical discussion and evaluation.

302

- 303 2.2. Economic Parameters
- 304 The overall goals when managing economic parameters are to:

305

306 Enable long-term economic sustainability for the Cardano Blockchain;

307

308 Ensure that stake pools are adequately rewarded for maintaining the Cardano Blockchain:

309

310 Ensure that ada owners are adequately rewarded for using stake in constructive ways, including when delegating ada for block production; and

311

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

313

- 314 Triggers for Change
- 315 Significant changes in the fiat value of ada resulting in potential problems with security, performance, functionality or long-term sustainability

316

317 Changes in transaction volumes or types

318

319 Community requests or suggestions

320

321 Emergency situations that require changes to economic parameters

322

323 Counter-indicators

event of a Severity 1 or Severity 2 network issue following careful technical discussion and evaluation.

349

- 350 2.2. Economic Parameters
- 351 The overall goals when managing economic parameters are to:

352

353 Enable long-term economic sustainability for the Cardano Blockchain;

354

355 Ensure that stake pools are adequately rewarded for maintaining the Cardano Blockchain;

356

357 Ensure that ada holders are adequately rewarded for using stake in constructive ways, including when delegating ada for block production; and

358

359 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)

360

- 361 Triggers for Change
- 362 Significant changes in the fiat value of ada resulting in potential problems with security, performance, functionality or long-term sustainability

363

364 Changes in transaction volumes or types

365

366 Community requests or suggestions

367

368 Emergency situations that require changes to economic parameters

369

370 Counter-indicators

324	Changes to the economic parameters should not be made in isolation. They need to account for:	371	Changes to the economic parameters should not be made in isolation. They need to account for:
325		372	
326 327	External economic factors	373 374	External economic factors
328 329	Network security concerns	375 376	Network security concerns
330	Core Metrics	377	Core Metrics
331	Fiat value of ada resulting in potential problems with security, performance, functionality or long-term sustainability	378	Fiat value of ada resulting in potential problems with security, performance, functionality or long-term sustainability
332		379	
333 334	Transaction volumes and types	380 381	Transaction volumes and types
335 336	Number and health of stake pools	382 383	Number and health of stake pools
337 338	External economic factors	384 385	External economic factors
	Changes to Specific Economic Parameters		Changes to Specific Economic Parameters
340	Transaction fee per byte (txFeePerByte) and fixed	387	Transaction fee per byte (txFeePerByte) and fixed
	transaction fee (txFeeFixed)		transaction fee (txFeeFixed)
341		388	
342	Defines the cost for basic transactions in lovelace:		Defines the cost for basic transactions in lovelace:
343		390	
344	<pre>fee(tx) = txFeeFixed + txFeePerByte x nBytes(tx)</pre>	391	<pre>fee(tx) = txFeeFixed + txFeePerByte x nBytes(tx)</pre>
345		392	
346	GUARDRAILS	393	GUARDRAILS
347	TFPB-01 (y) txFeePerByte must not be lower than 30 (0.000030 ada) This protects against low-cost denial of service attacks	394	TFPB-01 (y) txFeePerByte must not be lower than 30 (0.000030 ada) This protects against low-cost denial of service attacks
348	delitat of Service attacks	395	delitat of Service attacks
	TFPB-02 (y) txFeePerByte must not		TFPB-02 (y) txFeePerByte must not
549	exceed 1,000 (0.001 ada) This ensures that transactions can be paid for	390	exceed 1,000 (0.001 ada) This ensures that transactions can be paid for
350		397	
351	TFPB-03 (y) txFeePerByte must not be negative	398	TFPB-03 (y) txFeePerByte must not be negative
352		399	
353	TFF-01 (y) txFeeFixed must not be lower than 100,000 (0.1 ada) This protects against low-cost denial of service attacks	400	TFF-01 (y) txFeeFixed must not be lower than 100,000 (0.1 ada) This protects against low-cost denial of service attacks

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

356

357 TFF-03 (y) txFeeFixed must not be negative

358

359 TFGEN-01 (x - "should") To maintain a consistent level of protection agains denial-of-service attacks, txFeeFixed and txFeeFixed should be adjusted whenever Plutus Execution prices are adjusted (executionUnitPrices[steps/memory])

360

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

362

- 363 UTx0 cost per byte (utxoCostPerByte)
- 364 Defines the deposit (in lovelace) that is charged for each byte of storage that is held in a UTxO.

 This deposit is returned when the UTxO is no longer active.

365

366 Sets a minimum threshold on ada that is held within a single UTx0

367

368 Provides protection against low-cost denial of service attack on UTxO storage. DoS protection decreases in line with the free node memory (proportional to UTxO growth)

369

370 Helps reduce long-term storage costs for node users by providing an incentive to return UTxOs when

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

403

404 TFF-03 (y) txFeeFixed must not be negative

405

406 TFGEN-01 (x - "should") To maintain a consistent level of protection against denial-of-service attacks, txFeeFixed and txFeePerByte should be adjusted whenever Plutus Execution prices are adjusted (executionUnitPrices[steps/memory])

407

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

409

- 410 UTx0 cost per byte (utxoCostPerByte)
- 411 Defines the deposit (in lovelace) that is charged for each byte of storage that is held in a UTxO. This deposit is returned when the UTxO is no longer active.

412

413 Sets a minimum threshold on ada that is held within a single UTx0

414

415 Provides protection against lowcost denial of service attack on UTxO storage. DoS protection decreases in line with the free node memory (proportional to UTxO growth)

416

417 Helps reduce long-term storage costs for node users by providing an incentive to return UTxOs when

	no longer needed, or to merge UTxOs.		no longer needed, or to merge UTxOs.
371	01.003.	418	01.003.
	GUARDRAILS		GUARDRAILS
	UCPB-01 (y) utxoCostPerByte must		UCPB-01 (y) utxoCostPerByte must
	not be lower than 3,000 (0.003 ada)	0	not be lower than 3,000 (0.003 ada)
374	ada)	421	ada)
	UCPB-02 (y) utxoCostPerByte must		UCPB-02 (y) utxoCostPerByte must
0,0	not exceed 6,500 (0.0065 ada)		not exceed 6,500 (0.0065 ada)
376		423	, , , , , , , , , , , , , , , , , , ,
	UCPB-03 (y) utxoCostPerByte must		UCPB-03 (y) utxoCostPerByte must
	not be zero		not be zero
378		425	
379	UCPB-04 (y) utxoCostPerByte must	426	UCPB-04 (y) utxoCostPerByte must
	not be negative		not be negative
380		427	
381	UCPB-05a (x - "should") Changes	428	UCPB-05a (x - "should") Changes
	should account for		should account for
382		429	
383	The acceptable cost of attack	430	The acceptable cost of attack
384		431	
385	The acceptable time for an attack	432	The acceptable time for an attack
386		433	
387	The acceptable memory	434	The acceptable memory
	configuration for full node users		configuration for full node users
388		435	
389	The sizes of UTxOs and	436	The sizes of UTxOs and
390		437	
391	The current total node memory	438	The current total node memory
	usage		usage
392		439	
393	Stake address deposit	440	Stake address deposit
	(stakeAddressDeposit)		(stakeAddressDeposit)
394	Ensures that stake addresses are	441	Ensures that stake addresses are
	retired when no longer needed		retired when no longer needed
395		442	
396	Helps reduce long-term storage	443	Helps reduce long-term storage
	costs		costs
397		444	
398	Helps limit CPU and memory costs	445	Helps limit CPU and memory costs
	in the ledger		in the ledger
399		446	
400	The rationale for the deposit is	447	The rationale for the deposit is
	to incentivize that scarce memory		to incentivize that scarce memory
	resources are returned when they		resources are returned when they
	are no longer required. Reducing		are no longer required. Reducing
	the number of active stake		the number of active stake
	addresses also reduces processing		addresses also reduces processing
	and memory costs at the epoch		and memory costs at the epoch
	boundary when calculating stake		boundary when calculating stake
	snapshots.		snapshots.

401		448	
402	GUARDRAILS	449	GUARDRAILS
403	SAD-01 (y) stakeAddressDeposit must not be lower than 1,000,000 (1 ada)	450	SAD-01 (y) stakeAddressDeposit must not be lower than 1,000,000 (1 ada)
404	(1 ddd)	451	(1 ddd)
	SAD-02 (y) stakeAddressDeposit must not exceed 5,000,000 (5 ada)		SAD-02 (y) stakeAddressDeposit must not exceed 5,000,000 (5 ada)
406		453	
407	SAD-03 (y) stakeAddressDeposit must not be negative	454	SAD-03 (y) stakeAddressDeposit must not be negative
408		455	
409	Stake pool deposit	456	Stake pool deposit
	(stakePoolDeposit)		(stakePoolDeposit)
410	Ensures that stake pools are	457	Ensures that stake pools are
	retired by the stake pool		retired by the stake pool
	operator when no longer needed by them		operator when no longer needed by them
411		458	-1.5
	Helps reduce long-term storage costs		Helps reduce long-term storage costs
<i>/</i> 113	The rationale for the deposit is	160	The rationale for the deposit is
413	to incentivize that scarce memory	400	to incentivize that scarce memory
	resources are returned when they		resources are returned when they
			-
	are no longer required. Rewards		are no longer required. Rewards
	and stake snapshot calculations		and stake snapshot calculations
	are also impacted by the number		are also impacted by the number
	of active stake pools.		of active stake pools.
414		461	
	GUARDRAILS		GUARDRAILS
416	SPD-01 (y) stakePoolDeposit must not be lower than 250,000,000 (250 ada)	463	SPD-01 (y) stakePoolDeposit must not be lower than 250,000,000 (250 ada)
417	(230 ddd)	464	(230 ddd)
	SPD-02 (y) stakePoolDeposit must		SPD-02 (y) stakePoolDeposit must
410	not exceed 500,000,000 (500 ada)	403	not exceed 500,000,000 (500 ada)
419	not exceed 300,000,000 (300 ada)	466	not exceed 300,000,000 (300 ada)
	CDD 02 (v) stakeDeelDeepsit must		CDD 02 (v) stakeDeelDenesit must
420	SPD-03 (y) stakePoolDeposit must	407	SPD-03 (y) stakePoolDeposit must
101	not be negative	460	not be negative
421		468	
	Minimum Pool Cost (minPoolCost)		Minimum Pool Cost (minPoolCost)
	Part of the rewards mechanism		Part of the rewards mechanism
424		471	
425	The minimum pool cost is	472	The minimum pool cost is
	transferred to the pool rewards		transferred to the pool rewards
	address before any delegator		address before any delegator
	rewards are paid		rewards are paid
426	GUARDRAILS	473	GUARDRAILS
427	MPC-01 (y) minPoolCost must not	474	MPC-01 (y) minPoolCost must not
	be negative		be negative
428		475	

429 430	MPC-02 (y) minPoolCost must not exceed 500,000,000 (500 ada)	476 477	MPC-02 (y) minPoolCost must not exceed 500,000,000 (500 ada)
	MPC-03 (x - "should") minPoolCost should be set in line with the		MPC-03 (x - "should") minPoolCost should be set in line with the
	economic cost for operating a pool		economic cost for operating a pool
432		479	
	Treasury Cut (treasuryCut)		Treasury Cut (treasuryCut) Part of the rewards mechanism
434	Part of the rewards mechanism	481	Part of the rewards mechanism
436	The treasury cut portion of the	483	The treasury cut portion of the
	monetary expansion is transferred		monetary expansion is transferred
	to the treasury before any pool		to the treasury before any pool
	rewards are paid		rewards are paid
437		484	
438	Can be set in the range 0.0-1.0 (0%-100%)	485	Can be set in the range 0.0-1.0 (0%-100%)
439		486	
	GUARDRAILS		GUARDRAILS
441	TC-01 (y) treasuryCut must not be lower than 0.1 (10%)	488	TC-01 (y) treasuryCut must not be lower than 0.1 (10%)
442		489	
443	TC-02 (y) treasuryCut must not exceed 0.3 (30%)	490	TC-02 (y) treasuryCut must not exceed 0.3 (30%)
444		491	
	TC-03 (y) treasuryCut must not be negative		TC-03 (y) treasuryCut must not be negative
446		493	
447	TC-04 (y) treasuryCut must not exceed 1.0 (100%)		TC-04 (y) treasuryCut must not exceed 1.0 (100%)
448		495	
449	TC-05 (~ - no access to change history) treasuryCut must not be changed more than once in any 36 epoch period (approximately 6 months)	496	TC-05 (~ - no access to change history) treasuryCut must not be changed more than once in any 36 epoch period (approximately 6 months)
450		497	
451	Monetary Expansion Rate	498	Monetary Expansion Rate
	(monetaryExpansion)		(monetaryExpansion)
452 453	Part of the rewards mechanism	499 500	Part of the rewards mechanism
454	The monetary expansion controls	501	The monetary expansion controls
	the amount of reserves that is		the amount of reserves that is
	used for rewards each epoch		used for rewards each epoch
455	Governs the long-term	502	Governs the long-term
	sustainability of the Cardano Blockchain		sustainability of the Cardano Blockchain
456		503	
457	The reserves are gradually	504	The reserves are gradually
	depleted until no rewards are supplied		depleted until no rewards are supplied

458	GUARDRAILS	505	GUARDRAILS
459	ME-01 (y) monetaryExpansion must	506	ME-01 (y) monetaryExpansion must
	not exceed 0.005		not exceed 0.005
460		507	
461	ME-02 (y) monetaryExpansion must	508	ME-02 (y) monetaryExpansion must
	not be lower than 0.001		not be lower than 0.001
462		509	
	ME-03 (y) monetaryExpansion must		ME-03 (y) monetaryExpansion must
403		310	not be negative
101	not be negative	F11	not be negative
464	ME 04 /	511	ME 04 / U. J. J. III.)
465	ME-04 (x - "should")	512	ME-04 (x - "should")
	monetaryExpansion should not be		monetaryExpansion should not be
	varied by more than +/- 10% in		varied by more than +/- 10% in
	any 73-epoch period		any 73-epoch period
	(approximately 12 months)		(approximately 12 months)
466		513	
467	ME-05 (x - "should")	514	ME-05 (x - "should")
	monetaryExpansion should not be		monetaryExpansion should not be
	changed more than once in any 36-		changed more than once in any 36-
	epoch period (approximately 6		epoch period (approximately 6
	months)		months)
468		515	
	Plutus Script Execution Prices	516	Plutus Script Execution Prices
	<pre>(executionUnitPrices[priceSteps/p</pre>		<pre>(executionUnitPrices[priceSteps/p</pre>
	riceMemory])		riceMemory])
170	Define the fees for executing	517	Define the fees for executing
470	Plutus scripts	317	Plutus scripts
471	rtutus scripts	518	rtutus scripts
	Gives an economic return for		Gives an economic return for
4/2		319	
470	Plutus script execution	F20	Plutus script execution
473		520	
4/4	Provides security against low-	521	Provides security against low-
	cost DoS attacks		cost DoS attacks
475		522	
476	GUARDRAILS	523	GUARDRAILS
477	EIUP-PS-01 (y)	524	EIUP-PS-01 (y)
	<pre>executionUnitPrices[priceSteps]</pre>		<pre>executionUnitPrices[priceSteps]</pre>
	must not exceed 2,000 /		must not exceed 2,000 /
	10,000,000		10,000,000
478		525	
	EIUP-PS-02 (y)	526	EIUP-PS-02 (y)
	executionUnitPrices[priceSteps]		executionUnitPrices[priceSteps]
	must not be lower than 500 /		must not be lower than 500 /
	10,000,000		10,000,000
100	10,000,000	527	10,000,000
480 481	ETIID_DM_01 (v)		ETUD_DM_01 (v)
+01	EIUP-PM-01 (y)	320	EIUP-PM-01 (y)
	executionUnitPrices[priceMemory]		executionUnitPrices[priceMemory]
400	must not exceed 2,000 / 10,000		must not exceed 2,000 / 10,000
482		529	
483	EIUP-PM-02 (y)	530	EIUP-PM-02 (y)
	<pre>executionUnitPrices[priceMemory]</pre>		<pre>executionUnitPrices[priceMemory]</pre>

484	must not be lower than 400 / 10,000	531	must not be lower than 400 / 10,000
485	EIUP-GEN-01 (x - "similar to") The execution prices must be set so tha	532	EIUP-GEN-01 (x - "similar to") The execution prices must be set so that
486		533	
487	the cost of executing a transaction with maximum CPU steps is similar to the cost of a maximum sized non-script transaction and	534	the cost of executing a transaction with maximum CPU steps is similar to the cost of a maximum sized non-script transaction and
488		535	
489	the cost of executing a transaction with maximum memory units is similar to the cost of a maximum sized non-script transaction	536 537	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		EIUP-GEN-02 (x - "should") The
731	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.	330	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.
492	· ·	539	
493	This helps ensure that the requirements on block diffusion/propagation times are met.	540	This helps ensure that the requirements on block diffusion/propagation times are met.
494	Transaction fee per byte for a reference script	541	Transaction fee per byte for a reference script
405	(minFeeRefScriptCoinsPerByte)	F 40	<pre>(minFeeRefScriptCoinsPerByte)</pre>
495	Defines the cost for using Plutus	542	Defines the cost for using Plutus
496	reference scripts in lovelace	543	reference scripts in lovelace
	GUARDRAILS		GUARDRAILS
	MFRS-01 (y)		MFRS-01 (y)
499	minFeeRefScriptCoinsPerByte must not exceed 1,000 (0.001 ada)	546	minFeeRefScriptCoinsPerByte must not exceed 1,000 (0.001 ada)
	This ensures that transactions		This ensures that transactions
500	can be paid for	547	can be paid for
501	MFRS-02 (y)	548	MFRS-02 (y)
	minFeeRefScriptCoinsPerByte must not be negative		<pre>minFeeRefScriptCoinsPerByte must not be negative</pre>
502		549	

503	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
	$(\verb"executionUnitPrices" [steps/memory"]$
]) and whenever txFeeFixed is
	adjusted
E 0.4	

504

505 MFRS-04 (x - unquantifiable) Any changes to minFeeRefScriptCoinsPerByte must consider the implications of reducing the cost of a denial-ofservice attack or increasing the maximum transaction fee

506

- 507 2.3. Network Parameters
- 508 The overall goals when managing the Cardano Blockchain network parameters are to:

509

510 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

511

512 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

513

- 514 Triggers for Change
- 515 Changes to network parameters may be triggered by:

516

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

518

520

519 Anticipated changes in traffic demands

550 MFRS-03 (x - "should") To maintain a consistent level of protection against denial-ofservice attacks, minFeeRefScriptCoinsPerByte should be adjusted whenever Plutus Execution prices are adjusted (executionUnitPrices[steps/memory]) and whenever txFeeFixed is adjusted

551

552 MFRS-04 (x - unquantifiable) Any changes to minFeeRefScriptCoinsPerByte must consider the implications of reducing the cost of a denial-ofservice attack or increasing the maximum transaction fee

553

- 554 2.3. Network Parameters
- 555 The overall goals when managing the Cardano Blockchain network parameters are to:

556

557 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

558

559 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

560

- 561 Triggers for Change
- 562 Changes to network parameters may be triggered by:

563

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

565

566 Anticipated changes in traffic demands

521 522	Cardano Community requests	568 569	Cardano Community requests
523	Counter-indicators	570	Counter-indicators
524	Changes may need to be reversed	571	Changes may need to be reversed
	and/or should not be enacted in		and/or should not be enacted in
	the event of:		the event of:
525		572	
	Excessive block propagation		Excessive block propagation
	delays		delays
527	22.29.2	574	20.22,0
	Stake pools being unable to		Stake pools being unable to
220	handle traffic volume	3,3	handle traffic volume
529	mana te transfe vo tame	576	nanate trarrite vetame
	Scripts being unable to complete	577	Scripts being unable to complete
550	execution	377	execution
531	CACCUCION	578	CACCUCION
	Core Metrics		Core Metrics
	All decisions on parameter		All decisions on parameter
)))	changes should be informed by:	500	changes should be informed by:
534	changes should be informed by:	581	changes should be informed by.
	Block propagation delay profile		Block propagation delay profile
536	block propagation delay profite	583	block propagation delay profite
	Traffic volume (block size over		Traffic volume (block size over
J	time)	304	time)
538	time)	585	time)
	Comint valume (size of comints		Comint volume (size of comints
559	Script volume (size of scripts	300	Script volume (size of scripts
- 10	and execution units)	F07	and execution units)
540	Canink avanting and bandonsula	587	
	Script execution cost benchmarks		Script execution cost benchmarks
542	D1 1 (1:66)	589	D1 1 (1:66)
543	Block propagation delay/diffusion	590	Block propagation delay/diffusion
	benchmarks	E04	benchmarks
544		591	
545	-	592	Detailed benchmarking results are
	required to confirm the effect of		required to confirm the effect of
	any changes on mainnet		any changes on mainnet
	performance or behavior prior to		performance or behavior prior to
	enactment. The effects of		enactment. The effects of
	different transaction mixes must		different transaction mixes must
	be analyzed, including normal		be analyzed, including normal
	transactions, Plutus scripts, and		transactions, Plutus scripts, and
	governance actions.		governance actions.
546		593	
	GUARDRAILS		GUARDRAILS
548	NETWORK-01 (x - "should") No	595	NETWORK-01 (x - "should") No
	individual network parameter		individual network parameter
	should change more than once per		should change more than once per
	two epochs		two epochs
549		596	
550	NETWORK-02 (x - "should") Only	597	NETWORK-02 (x - "should") Only
	one network parameter should be		one network parameter should be
	changed per epoch unless they are		changed per epoch unless they are

directly correlated, e.g., pertransaction and per-block memory unit limits

551

- 552 Changes to Specific Network Parameters
- 553 Block Size (maxBlockBodySize)
- 554 The maximum size of a block, in Bytes.

555

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

558

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

560

561 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

562

563 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)

564

565 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

566

567 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

568

569 MBBS-07 (x - "unquantifiable")
The impact of any change to

directly correlated, e.g., pertransaction and per-block memory unit limits

598

- 599 Changes to Specific Network Parameters
- 600 Block Size (maxBlockBodySize)
- 601 The maximum size of a block, in Bytes.

602

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

605

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609

610 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)

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(10KB) per epoch (5 days), and
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613

614 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

615

616 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

570

- 571 Transaction Size (maxTxSize)
- 572 The maximum size of a transaction, in Bytes.

573

- 574 GUARDRAILS
- 575 MTS-01 (y) maxTxSize must not exceed 32,768 Bytes (32KB)

576

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

578

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

580

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

582

583 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

584

585 MTS-06 (x - "should") maxTxSize should not exceed 1/4 of the block size

586

587 Memory Unit Limits
 (maxBlockExecutionUnits[memory],
 maxTxExecutionUnits[memory])

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

617

- 618 Transaction Size (maxTxSize)
- 619 The maximum size of a transaction, in Bytes.

620

- 621 GUARDRAILS
- 622 MTS-01 (y) maxTxSize must not exceed 32,768 Bytes (32KB)

623

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

625

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

627

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

629

630 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

631

632 MTS-06 (x - "should") maxTxSize should not exceed 1/4 of the block size

633

634 Memory Unit Limits
 (maxBlockExecutionUnits[memory],
 maxTxExecutionUnits[memory])

588	The limit on the maximum number of memory units that can be used by Plutus scripts, either pertransaction or per-block.	635	The limit on the maximum number of memory units that can be used by Plutus scripts, either pertransaction or per-block.
589	·	636	·
590	GUARDRAILS	637	GUARDRAILS
591	MTEU-M-01 (y)	638	MTEU-M-01 (y)
	<pre>maxTxExecutionUnits[memory] must</pre>		<pre>maxTxExecutionUnits[memory] must</pre>
	not exceed 40,000,000 units		not exceed 40,000,000 units
592		639	
593	MTEU-M-02 (y)	640	MTEU-M-02 (y)
	<pre>maxTxExecutionUnits[memory] must</pre>		<pre>maxTxExecutionUnits[memory] must</pre>
	not be negative		not be negative
594		641	
595	MTEU-M-03 (\sim - no access to	642	MTEU-M-03 (\sim - no access to
	existing parameter values)		existing parameter values)
	maxTxExecutionUnits[memory] must		maxTxExecutionUnits[memory] must
	not be decreased		not be decreased
596	MT-11 M 04 (643	
9/	MTEU-M-04 (x - "should")	644	MTEU-M-04 (x - "should")
	maxTxExecutionUnits[memory]		maxTxExecutionUnits[memory]
	should not be increased by more		should not be increased by more
598	than 2,500,000 units in any epoch	645	than 2,500,000 units in any epoch
	MBEU-M-01 (y)		MBEU-M-01 (y)
	maxBlockExecutionUnits[memory]	040	maxBlockExecutionUnits[memory]
	must not exceed 120,000,000 units		must not exceed 120,000,000 units
500		647	
501	MBEU-M-02 (y)	648	MBEU-M-02 (y)
	maxBlockExecutionUnits[memory]		maxBlockExecutionUnits[memory]
	must not be negative		must not be negative
502		649	
503	MBEU-M-03 (x - "should")	650	MBEU-M-03 (x - "should")
	<pre>maxBlockExecutionUnits[memory]</pre>		<pre>maxBlockExecutionUnits[memory]</pre>
	should not be changed (increased		should not be changed (increased
	or decreased) by more than		or decreased) by more than
	10,000,000 units in ANY epoch		10,000,000 units in ANY epoch
504		651	
505	MBEU-M-04a (x - unquantifiable)	652	MBEU-M-04a (x - unquantifiable)
	The impact of any change to		The impact of any change to
	maxBlockExecutionUnits[memory]		maxBlockExecutionUnits[memory]
	must be confirmed by detailed		must be confirmed by detailed
	benchmarking/simulation and not		benchmarking/simulation and not
	exceed the requirements of the block diffusion/propagation time		exceed the requirements of the block diffusion/propagation time
	budgets, as also impacted by		budgets, as also impacted by
	maxBlockExecutionUnits[steps] and		maxBlockExecutionUnits[steps] and
	maxBlockBodySize. Any increase		maxBlockBodySize. Any increase
	must also consider previously		must also consider previously
	agreed future requirements for		agreed future requirements for
	the total block size		the total block size
	(maxBlockBodySize) measured		(maxBlockBodySize) measured

against the total block diffusion target of 3s with 95% block propagation within 5s. Future Plutus performance improvements may allow the per-block memory limit to be increased, but must be balanced against the overall diffusion limits as specified in the previous sentence, and future requirements

606

607 MEU-M-01 (~ - no access to existing parameter values)
maxBlockExecutionUnits[memory]
must not be less than
maxTxExecutionUnits[memory]

608

- 609 CPU Unit Limits
 (maxBlockExecutionUnits[steps],
 maxTxExecutionUnits[steps])
- of CPU steps that can be used by Plutus scripts, either per transaction or per-block.

611

- 612 GUARDRAILS
- 613 MTEU-S-01 (y)
 maxTxExecutionUnits[steps] must
 not exceed 15,000,000,000 (15Bn)
 units

614

615 MTEU-S-02 (y)
 maxTxExecutionUnits[steps] must
 not be negative

616

617 MTEU-S-03 (~ - no access to
 existing parameter values)
 maxTxExecutionUnits[steps] must
 not be decreased

618

619 MTEU-S-04 (x - "should")
 maxTxExecutionUnits[steps] should
 not be increased by more than
 500,000,000 (500M) units in any
 epoch (5 days)

620

621 MBEU-S-01 (y)
 maxBlockExecutionUnits[steps]
 must not exceed 40,000,000,000
 (40Bn) units

against the total block diffusion target of 3s with 95% block propagation within 5s. Future Plutus performance improvements may allow the per-block memory limit to be increased, but must be balanced against the overall diffusion limits as specified in the previous sentence, and future requirements

653

654 MEU-M-01 (~ - no access to existing parameter values)
maxBlockExecutionUnits[memory]
must not be less than
maxTxExecutionUnits[memory]

655

- 656 CPU Unit Limits
 (maxBlockExecutionUnits[steps],
 maxTxExecutionUnits[steps])
- of CPU steps that can be used by Plutus scripts, either per transaction or per-block.

658

- 659 GUARDRAILS
- 660 MTEU-S-01 (y)
 maxTxExecutionUnits[steps] must
 not exceed 15,000,000,000 (15Bn)
 units

661

662 MTEU-S-02 (y)
 maxTxExecutionUnits[steps] must
 not be negative

663

664 MTEU-S-03 (~ - no access to existing parameter values)
maxTxExecutionUnits[steps] must not be decreased

665

666 MTEU-S-04 (x - "should")
maxTxExecutionUnits[steps] should
not be increased by more than
500,000,000 (500M) units in any
epoch (5 days)

667

668 MBEU-S-01 (y)
 maxBlockExecutionUnits[steps]
 must not exceed 40,000,000,000
 (40Bn) units

669

623 MBEU-S-02 (y)
maxBlockExecutionUnits[steps]
must not be negative

624

- 625 MBEU-S-03 (x "should")
 maxBlockExecutionUnits[steps]
 should not be changed (increased
 or decreased) by more than
 2,000,000,000 (2Bn) units in any
 epoch (5 days)
- 626 627 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
- 628
 629 MEU-S-01 (~ no access to existing parameter values)
 maxBlockExecutionUnits[steps]
 must not be less than
 maxTxExecutionUnits[steps]
- 631 Block Header Size (maxBlockHeaderSize)

requirements

- 632 The size of the block header.
- 634 GUARDRAILS

630

633

636

- 635 MBHS-01 (y) maxBlockHeaderSize must not exceed 5,000 Bytes
- 637 MBHS-02 (y) maxBlockHeaderSize must not be negative

670 MBEU-S-02 (y)
maxBlockExecutionUnits[steps]
must not be negative

671

- 672 MBEU-S-03 (x "should")

 maxBlockExecutionUnits[steps]

 should not be changed (increased or decreased) by more than

 2,000,000,000 (2Bn) units in any epoch (5 days)
- 673 674 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
- 676 MEU-S-01 (~ no access to existing parameter values)
 maxBlockExecutionUnits[steps]
 must not be less than
 maxTxExecutionUnits[steps]
- 677 678 Block Header Size (maxBlockHeaderSize)

requirements

675

- 679 The size of the block header.
- 681 GUARDRAILS
- 682 MBHS-01 (y) maxBlockHeaderSize must not exceed 5,000 Bytes
- 683
 684 MBHS-02 (y) maxBlockHeaderSize must not be negative

638		685	
	MBHS-03 (x - "largest valid header" is subject to change) maxBlockHeaderSize must be large enough for the largest valid header		MBHS-03 (x - "largest valid header" is subject to change) maxBlockHeaderSize must be large enough for the largest valid header
640		687	
641	MBHS-04 (x - "should") maxBlockHeaderSize should only normally be increased if the protocol changes		MBHS-04 (x - "should") maxBlockHeaderSize should only normally be increased if the protocol changes
642		689	
643	MBHS-05 (x - "should") maxBlockHeaderSize should be within TCP's initial congestion window (3 or 10 MTUs)	690	MBHS-05 (x - "should") maxBlockHeaderSize should be within TCP's initial congestion window (3 or 10 MTUs)
644		691	
	2.4. Technical/Security Parameters		2.4. Technical/Security Parameters
646	The overall goals when managing the technical/security parameters are:	693	The overall goals when managing the technical/security parameters are:
647		694	
648	Ensure the security of the Cardano Blockchain network in terms of decentralization and protection against adversarial actions	695	Ensure the security of the Cardano Blockchain network in terms of decentralization and protection against adversarial actions
649		696	
650	Enable changes to the Plutus language	697	Enable changes to the Plutus language
651		698	
	Triggers for Change Changes in the number of active SPOs		Triggers for Change Changes in the number of active SPOs
654		701	
655 656	Changes to the Plutus language	702 703	Changes to the Plutus language
658	Security threats	705	Security threats
660	Cardano Community requests	707	Cardano Community requests
	Counter-indicators		Counter-indicators
662	Economic concerns, e.g. when changing the number of stake pools	709	Economic concerns, e.g. when changing the number of stake pools
663	Core Metrics	710	Core Metrics
664 665	Number of stake pools	711 712	Number of stake pools
666 667	Level of decentralization	713 714	Level of decentralization

668	Changes to Specific Technical/Security Parameters	715	Changes to Specific Technical/Security Parameters
669	Target Number of Stake Pools (stakePoolTargetNum)	716	<pre>Target Number of Stake Pools (stakePoolTargetNum)</pre>
	Sets the target number of stake pools		Sets the target number of stake pools
671		718	
672	The expected number of stake pools when the network is in the equilibrium state	719	The expected number of stake pools when the network is in the equilibrium state
673		720	
674	Primarily a security parameter, ensuring decentralization by stake pool division/replication	721	Primarily a security parameter, ensuring decentralization by stake pool division/replication
675		722	
676	Has an economic effect as well as a security effect — economic advice is also required when changing this parameter	723	Has an economic effect as well as a security effect — economic advice based on analysis is also required when changing this parameter
677		724	
	Large changes in this parameter will trigger mass redelegation events		Large changes in this parameter will trigger mass redelegation events
679		726	
	GUARDRAILS		GUARDRAILS
	SPTN-01 (y) stakePoolTargetNum must not be lower than 250		SPTN-01 (y) stakePoolTargetNum must not be lower than 250
682		729	
683	SPTN-02 (y) stakePoolTargetNum must not exceed 2,000	730	SPTN-02 (y) stakePoolTargetNum must not exceed 2,000
684	, , , , , , , , , , , , , , , , , , , ,	731	, , , , , , , , , , , , , , , , , , , ,
	SPTN-03 (y) stakePoolTargetNum		SPTN-03 (y) stakePoolTargetNum
686	must not be negative	733	must not be negative
	SPTN-04 (y) stakePoolTargetNum		SPTN-04 (y) stakePoolTargetNum
	must not be zero		must not be zero
688	District Traffic and Franks	735	Diadas Taflassas Fastas
689	Pledge Influence Factor	/30	Pledge Influence Factor
	(poolPledgeInfluence)		(poolPledgeInfluence)
690	Enables the pledge protection mechanism	737	Enables the pledge protection mechanism
691		738	
692	Provides protection against Sybil attack	739	Provides protection against Sybil attack
693		740	
694	Higher values reward pools that have more pledge and penalize pools that have less pledge	741	Higher values reward pools that have more pledge and penalize pools that have less pledge
695	Has an economic effect as well as technical effect — economic	742	Has an economic effect as well as technical effect — economic

advice is also required

cost attacks by making it more

expensive rather than less

			required
696		743	
697	GUARDRAILS	744	GUARDRAILS
698	PPI-01 (y) poolPledgeInfluence	745	PPI-01 (y) poolPledgeInfluence
	must not be lower than 0.1		must not be lower than 0.1
699		746	
700	PPI-02 (y) poolPledgeInfluence must not exceed 1.0	747	PPI-02 (y) poolPledgeInfluence must not exceed 1.0
701		748	
702	PPI-03 (y) poolPledgeInfluence must not be negative	749	PPI-03 (y) poolPledgeInfluence must not be negative
703		750	
704	PPI-04 (x - "should")	751	PPI-04 (x - "should")
	poolPledgeInfluence should not		poolPledgeInfluence should not
	vary by more than +/- 10% in any		vary by more than +/- 10% in any
	18-epoch period (approximately 3		18-epoch period (approximately 3
705	months)	750	months)
705	Dool Datimoment Window	752	Deel Detinement Window
700	Pool Retirement Window	/53	Pool Retirement Window
707	(poolRetireMaxEpoch)	754	(poolRetireMaxEpoch)
/0/	Defines the maximum number of	/54	Defines the maximum number of
	epochs notice that a pool can		epochs notice that a pool can
700	give when planning to retire	755	give when planning to retire
708	CHAPPRATIC	755	CHARDRATIC
	GUARDRAILS		GUARDRAILS
/10	PRME-01 (y) poolRetireMaxEpoch	/5/	PRME-01 (y) poolRetireMaxEpoch
744	must not be negative	750	must not be negative
711	DDME 02 (758	PDME 02 /
/12	PRME-02 (x - "should")	/59	PRME-02 (x - "should")
	<pre>poolRetireMaxEpoch should not be lower than 1</pre>		<pre>poolRetireMaxEpoch should not be lower than 1</pre>
713		760	
714	Collateral Percentage	761	Collateral Percentage
	(collateralPercentage)		(collateralPercentage)
715	Defines how much collateral must	762	Defines how much collateral must
	be provided when executing a		be provided when executing a
	Plutus script as a percentage of		Plutus script as a percentage of
	the normal execution cost		the normal execution cost
716		763	
717	Collateral is additional to fee payments	764	Collateral is additional to fee payments
718		765	•
719	If a script fails to execute,	766	If a script fails to execute,
	then the collateral is lost		then the collateral is lost
720		767	
	The collateral is never lost if a	768	The collateral is never lost if a
	script executes successfully		script executes successfully
722		769	
723	Provides security against low-	770	Provides security against low-

advice based on analysis is also

а

cost attacks by making it more

expensive rather than less

	expensive to execute failed		expensive to execute failed
	scripts		scripts
724		771	
725	GUARDRAILS	772	GUARDRAILS
726	CP-01 (y) collateralPercentage	773	CP-01 (y) collateralPercentage
	must not be lower than 100		must not be lower than 100
727		774	
728	CP-02 (y) collateralPercentage	775	CP-02 (y) collateralPercentage
	must not exceed 200		must not exceed 200
729		776	
730	CP-03 (y) collateralPercentage	777	CP-03 (y) collateralPercentage
	must not be negative		must not be negative
731		778	
732	CP-04 (y) collateralPercentage	779	CP-04 (y) collateralPercentage
	must not be zero		must not be zero
733		780	
734	Maximum number of collateral	781	Maximum number of collateral
	<pre>inputs (maxCollateralInputs)</pre>		<pre>inputs (maxCollateralInputs)</pre>
735	Defines the maximum number of	782	Defines the maximum number of
	inputs that can be used for		inputs that can be used for
	collateral when executing a		collateral when executing a
	Plutus script		Plutus script
736		783	
737	GUARDRAILS	784	GUARDRAILS
738	MCI-01 (y) maxCollateralInputs	785	MCI-01 (y) maxCollateralInputs
	must not be lower than 1		must not be lower than 1
739		786	
740	Maximum Value Size (maxValueSize)	787	Maximum Value Size (maxValueSize)
741	The limit on the serialized size	788	The limit on the serialized size
	of the Value in each output.		of the Value in each output.
742	·	789	·
743	GUARDRAILS	790	GUARDRAILS
744	MVS-01 (y) maxValueSize must not		MVS-01 (y) maxValueSize must not
	exceed 12,288 Bytes (12KB)		exceed 12,288 Bytes (12KB)
745	,,	792	,,
	MVS-02 (y) maxValueSize must not		MVS-02 (y) maxValueSize must not
	be negative		be negative
747		794	
	MVS-03 (~ - no access to existing		MVS-03 (~ - no access to existing
	parameter values) maxValueSize		parameter values) maxValueSize
	must be less than maxTxSize		must be less than maxTxSize
749	mast se tess than maximisize	796	mase so tess than maximusize
	MVS-04 (~ - no access to existing		MVS-04 (~ - no access to existing
,50	parameter values) maxValueSize	, , ,	parameter values) maxValueSize
	must not be reduced		must not be reduced
751	mase not be reduced	798	mase not be reduced
	MVS-05 (x - "sensible output" is		MVS-05 (x - "sensible output" is
132	subject to interpretation)	133	subject to interpretation)
	maxValueSize must be large enough		maxValueSize must be large enough
	to allow sensible outputs (e.g.		to allow sensible outputs (e.g.
	any existing on-chain output or		anv existing on-chain output or

anticipated outputs that could be produced by new ledger rules)

753

754 Plutus Cost Models (costModels)

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

756

757 A different cost model is required for each Plutus version. Each cost model comprises many distinct cost model values. Cost models are defined for each Plutus language version. A new language version may introduce additional cost model values or remove existing cost model values.

758

759 GUARDRAILS

760 PCM-01 (x - unquantifiable) Cost
 model values must be set by
 benchmarking on a reference
 architecture

761

762 PCM-02 (x - primitives and language versions aren't introduced in transactions) The cost model must be updated if new primitives are introduced or a new Plutus language version is added

763

764 PCM-03a (~ - no access to Plutus cost model parameters) Cost model values should not normally be negative. Negative values must be justified against the underlying cost model for the associated primitives

765

766 PCM-04 (~ - no access to Plutus cost model parameters) A cost model must be supplied for each Plutus language version that the protocol supports

767

768 2.5. Governance Parameters

769 The overall goals when managing the governance parameters are to:

anticipated outputs that could be produced by new ledger rules)

800

801 Plutus Cost Models (costModels)

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

803

804 A different cost model is required for each Plutus version. Each cost model comprises many distinct cost model values. Cost models are defined for each Plutus language version. A new language version may introduce additional cost model values or remove existing cost model values.

805

806 GUARDRAILS

807 PCM-01 (x - unquantifiable) Cost model values must be set by benchmarking on a reference architecture

808

809 PCM-02 (x - primitives and language versions aren't introduced in transactions) The cost model must be updated if new primitives are introduced or a new Plutus language version is added

810

811 PCM-03a (~ - no access to Plutus cost model parameters) Cost model values should not normally be negative. Negative values must be justified against the underlying cost model for the associated primitives

812

813 PCM-04 (~ - no access to Plutus cost model parameters) A cost model must be supplied for each Plutus language version that the protocol supports

814

815 2.5. Governance Parameters

816 The overall goals when managing the governance parameters are to:

817

771 772	Ensure governance stability	818 819	Ensure governance stability
773	Maintain a representative form of	820	Maintain a representative form of
	governance		governance
774	T	821	
	Triggers for Change		Triggers for Change
	Changes to governance parameters may be triggered by:		Changes to governance parameters may be triggered by:
777		824	
	Cardano Community requests		Cardano Community requests
779	Degulatory requirements	826	Dogulatory requirements
780	Regulatory requirements	828	Regulatory requirements
	Unexpected or unwanted governance		Unexpected or unwanted governance
	outcomes		outcomes
783		830	
784 785	Entering a state of no confidence		Entering a state of no confidence
	Counter-indicators	832	Counter-indicators
	Changes may need to be reversed		Changes may need to be reversed
707	and/or should not be enacted in	034	and/or should not be enacted in
	the event of:		the event of:
788		835	
	Unexpected effects on governance		Unexpected effects on governance
790		837	Ţ
791	Excessive Layer 1 load due to on-	838	Excessive Layer 1 load due to on-
	chain voting or excessive numbers		chain voting or excessive numbers
	of governance actions		of governance actions
792		839	
	Core Metrics		Core Metrics
794	All decisions on parameter	841	All decisions on parameter
705	changes should be informed by:	0.42	changes should be informed by:
795 706	Governance participation levels	842	Governance participation levels
797	dovernance participation tevets	844	dovernance participation tevets
	Governance behaviors and patterns		Governance behaviors and patterns
799	covernance senaviors and parterns	846	covernance senaviors and parterns
800	Regulatory considerations	847	Regulatory considerations
801		848	
802	Confidence in the governance	849	Confidence in the governance
	system		system
803		850	
804	The effectiveness of the	851	The effectiveness of the
	governance system in managing		governance system in managing
	necessary change		necessary change
805		852	
	Changes to Specific Governance Parameters		Changes to Specific Governance Parameters
807	Deposit for Governance Actions	854	Deposit for Governance Actions
	(govDeposit)		(govDeposit)
808	The deposit that is charged when	855	The deposit that is charged when
	submitting a governance action.		submitting a governance action.

809		856	
810	Helps to limit the number of	857	Helps to limit the number of
	actions that are submitted		actions that are submitted
811	GUARDRAILS	858	GUARDRAILS
812	GD-01 (y) govDeposit must not be negative	859	GD-01 (y) govDeposit must not be negative
813		860	
814	GD-02 (y) govDeposit must not be lower than 1,000,000 (1 ada)	861	GD-02 (y) govDeposit must not be lower than 1,000,000 (1 ada)
815		862	
816	GD-03a (y) govDeposit must not exceed 10,000,000,000,000 (10 million ada)	863	GD-03a (y) govDeposit must not exceed 10,000,000,000,000 (10 million ada)
817		864	
818	GD-04 (x - "should") govDeposit should be adjusted in line with fiat changes	865	GD-04 (x - "should") govDeposit should be adjusted in line with fiat changes
819		866	
820	Deposit for DReps (dRepDeposit)	867	Deposit for DReps (dRepDeposit)
821	The deposit that is charged when registering a DRep.	868	The deposit that is charged when registering a DRep.
822		869	
823	Helps to limit the number of active DReps	870	Helps to limit the number of active DReps
824	GUARDRAILS	871	GUARDRAILS
825	DRD-01 (y) dRepDeposit must not	872	DRD-01 (y) dRepDeposit must not
	be negative		be negative
826		873	
827	DRD-02 (y) dRepDeposit must not be lower than 1,000,000 (1 ada)		DRD-02 (y) dRepDeposit must not be lower than 1,000,000 (1 ada)
828	DDD 02 (v) dDagDagasit most get	875	DDD 02 (v) dD-aD-ait most ast
829	DRD-03 (y) dRepDeposit must not exceed 100,000,000,000 (100,000 ada)	876	DRD-03 (y) dRepDeposit must not exceed 100,000,000,000 (100,000 ada)
830		877	
831	DRD-04 (x - "should") dRepDeposit	878	DRD-04 (x - "should") dRepDeposit
	should be adjusted in line with fiat changes		should be adjusted in line with fiat changes
832	-	879	-
833	DRep Activity Period (dRepActivity)	880	DRep Activity Period (dRepActivity)
834	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.	881	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.
835		882	
836	GUARDRAILS	883	GUARDRAILS
837	DRA-01 (y) dRepActivity must not be lower than 13 epochs (2 months)	884	DRA-01 (y) dRepActivity must not be lower than 13 epochs (65 days)

838		885	
839	DRA-02 (y) dRepActivity must not exceed 37 epochs (6 months)	886	DRA-02 (y) dRepActivity must not exceed 37 epochs (185 days)
840		887	
841	DRA-03 (y) dRepActivity must not be negative	888	DRA-03 (y) dRepActivity must not be negative
842		889	
843	DRA-04 (~ - no access to existing parameter values) dRepActivity must be greater than govActionLifetime	890	DRA-04 (~ - no access to existing parameter values) dRepActivity must be greater than govActionLifetime
844		891	
845	DRA-05 (x - "should") dRepActivity should be calculated in human terms (2 months etc)	892	DRA-05 (x - "should") dRepActivity should be calculated in human terms (60 days etc)
846		893	
	DRep and SPO Governance Action Thresholds		DRep and SPO Governance Action Thresholds
	<pre>(dRepVotingThresholds[],poolVo tingThresholds[])</pre>		<pre>(dRepVotingThresholds[],poolVo tingThresholds[])</pre>
848	Thresholds on the active voting stake that is required to ratify a specific type of governance action by either DReps or SPOs.	895	Thresholds on the active voting stake that is required to ratify a specific type of governance action by either DReps or SPOs.
849	·	896	,
850	Ensures legitimacy of the action	897	Ensures legitimacy of the action
851	The threshold parameters are listed below:	898	The threshold parameters are listed below:
852		899	
853 854	dRepVotingThresholds:	900 901	dRepVotingThresholds:
	dvtCommitteeNoConfidence		dvtCommitteeNoConfidence
856		903	
	dvtCommitteeNormal	904	dvtCommitteeNormal
	dvtHardForkInitiation	905	dvtHardForkInitiation
860	dvtilai di di killittatidii	907	dv (iiai di di kliilt latidii
	dvtMotionNoConfidence	908	dvtMotionNoConfidence
	dvtPPEconomicGroup	909	dvtPPEconomicGroup
864	dv trr Leonomited oup	911	aver r Leonomited oup
	dvtPPGovGroup		dvtPPGovGroup
866	4. C. 1 00 voi oup	913	αν ε. τ σον στο αρ
	dvtPPNetworkGroup		dvtPPNetworkGroup
868	2. 2	915	2. 2
	dvtPPTechnicalGroup		dvtPPTechnicalGroup
870		917	
	dvtTreasuryWithdrawal		dvtTreasuryWithdrawal
872	-	919	-
873	dvtUpdateToConstitution	920	dvtUpdateToConstitution

	921	
<pre>poolVotingThresholds:</pre>	922 923	<pre>poolVotingThresholds:</pre>
pvtCommitteeNoConfidence	924 925	pvtCommitteeNoConfidence
pvtCommitteeNormal	926 927	pvtCommitteeNormal
pvtHardForkInitiation	928 929	pvtHardForkInitiation
pvtMotionNoConfidence	930 931	pvtMotionNoConfidence
pvtPPSecurityGroup	932 933	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-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-GEN-03 (y) Governance parameter thresholds must be in the range 75%-90%
VT-HF-01 (y) Hard fork action thresholds must be in the range 51%-80%	941	VT-HF-01 (y) "Hard Fork Initiation" action thresholds must be in the range 51%-80%
	942	
VT-CON-01 (y) New Constitution or Guardrails Script action thresholds must be in the range 65%-90%	943	VT-CON-01 (y) "New Constitution" action thresholds must be in the range 65%-90%
	944	
VT-CC-01 (y) Update Constitutional Committee action thresholds must be in the range 51%-90%	945	VT-CC-01 (y) "Update Committee" action thresholds must be in the range 51%-90%
	946	
VT-NC-01 (y) No confidence action thresholds must be in the range 51%-75%	947	VT-NC-01 (y) "No Confidence" action thresholds must be in the range 51%-75%
	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 action thresholds must be in the range 51%-80% VT-CON-01 (y) New Constitution or Guardrails Script action thresholds must be in the range 65%-90% VT-CC-01 (y) Update Constitutional Committee action thresholds must be in the range 51%-90% VT-NC-01 (y) No confidence action thresholds must be in the range	poolVotingThresholds: 922 923 pvtCommitteeNoConfidence 924 925 pvtCommitteeNormal 926 927 pvtHardForkInitiation 928 pvtMotionNoConfidence 930 pvtPPSecurityGroup 932 GUARDRAILS VT-GEN-01 (y) All thresholds must be greater than 50% and less than or equal to 100% 936 VT-GEN-02a (y) Economic, network and technical/security parameter thresholds must be in the range 51%-75% 938 VT-GEN-03 (y) Governance 939 parameter thresholds must be in the range 75%-90% 940 VT-HF-01 (y) Hard fork action thresholds must be in the range 51%-80% 942 VT-CON-01 (y) New Constitution or Guardrails Script action thresholds must be in the range 65%-90% 944 VT-CC-01 (y) Update 945 Constitutional Committee action thresholds must be in the range 51%-90% 946 VT-NC-01 (y) No confidence action thresholds must be in the range 947 VT-NC-01 (y) No confidence action 947

004	it is not enacted — as a whole number of epochs	051	it is not enacted — as a whole number of epochs
904	GUARDRAILS	951	GUARDRAILS
	GAL-01 (y) govActionLifetime must		GAL-01 (y) govActionLifetime must
300	not be lower than 1 epoch (5	333	not be lower than 1 epoch (5
907	days)	954	days)
	GAL-03 (x - "should")		GAL-03 (x - "should")
500	govActionLifetime should not be	333	govActionLifetime should not be
	lower than 2 epochs (10 days)		lower than 2 epochs (10 days)
909	conc. chan is opening (is days)	956	coner and a openio (10 days)
910	GAL-02 (y) govActionLifetime must	957	GAL-02 (y) govActionLifetime must
	not exceed 15 epochs (75 days)		not exceed 15 epochs (75 days)
911	•	958	·
912	GAL-04 (x - "should")	959	GAL-04 (x - "should")
	govActionLifetime should be		govActionLifetime should be
	calibrated in human terms (eg 30		calibrated in human terms (eg 30
	days, two weeks), to allow		days, two weeks), to allow
	sufficient time for voting etc.		sufficient time for voting etc.
	to take place		to take place
913		960	
914	GAL-05 (∼ - no access to existing	961	GAL-05 (\sim - no access to existing
	parameter values)		parameter values)
	govActionLifetime must be less		govActionLifetime must be less
015	than dRepActivity	063	than dRepActivity
915	Marriage Constitutional Constitution	962	Marriagon Constitutional Consists
910	Maximum Constitutional Committee	963	Maximum Constitutional Committee
017	Term (committeeMaxTermLength) The limit on the maximum term	064	Term (committeeMaxTermLength) The limit on the maximum term
917	length that a committee member	904	length that a committee member
	may serve		may serve
918	may serve	965	may serve
919	GUARDRAILS		GUARDRAILS
	CMTL-01a (y)		CMTL-01a (y)
-	committeeMaxTermLength must not		committeeMaxTermLength must not
	be zero		be zero
921		968	
922	CMTL-02a (y)	969	CMTL-02a (y)
	committeeMaxTermLength must not		<pre>committeeMaxTermLength must not</pre>
	be negative		be negative
923		970	
924	CMTL-03a (y)	971	CMTL-03a (y)
	committeeMaxTermLength must not		committeeMaxTermLength must not
	be lower than 18 epochs (90 days,		be lower than 18 epochs (90 days,
	or approximately 3 months)		or approximately 3 months)
925		972	
926	-	973	CMTL-04a (y)
	committeeMaxTermLength must not		committeeMaxTermLength must not
	exceed 293 epochs (approximately		exceed 293 epochs (approximately
027	4 years)	074	4 years)
927		974	

928	CMTL-05a (x - "should")	975	CMTL-05a (x - "should")
	committeeMaxTermLength should not		committeeMaxTermLength should not
	exceed 220 epochs (approximately		exceed 220 epochs (approximately
	3 years)		3 years)
929		976	
930	The minimum size of the	977	The minimum size of the
	Constitutional Committee		Constitutional Committee
	(committeeMinSize)		(committeeMinSize)
931	The least number of members that	978	The least number of members that
331	can be included in a	370	can be included in a
	Constitutional Committee		Constitutional Committee
	following a governance action to		following a governance action to
	change the Constitutional		change the Constitutional Committee.
022	Committee.	070	Committee.
932	CHAPPRATIC	979	CHARRATIC
	GUARDRAILS		GUARDRAILS
934	CMS-01 (y) committeeMinSize must	981	CMS-01 (y) committeeMinSize must
	not be negative		not be negative
935		982	
936	CMS-02 (y) committeeMinSize must	983	CMS-02 (y) committeeMinSize must
	not be lower than 3		not be lower than 3
937		984	
938	CMS-03 (y) committeeMinSize must	985	CMS-03 (y) committeeMinSize must
	not exceed 10		not exceed 10
939		986	
940	2.6. Monitoring and Reversion of	987	2.6. Monitoring and Reversion of
	Parameter Changes		Parameter Changes
941	All network parameter changes	988	All network parameter changes
	must be monitored carefully for		must be monitored carefully for
	no less than 2 epochs (10 days)		no less than 2 epochs (10 days)
942		989	
943	Changes must be reverted as soon	990	Changes must be reverted as soon
	as possible if block propagation		as possible if block propagation
	delays exceed 4.5s for more than		delays exceed 4.5s for more than
	5% of blocks over any 6 hour		5% of blocks over any 6 hour
	rolling window		rolling window
944	All other parameter changes	001	All other parameter changes
544	should be monitored	331	should be monitored
945	Should be monitored	992	
	The reversion plan should be		
940	The reversion plan should be	993	The reversion plan should be
	implemented if the overall effect		implemented if the overall effect
	on performance, security,		on performance, security,
	functionality or long-term		functionality or long-term
0.47	sustainability is unacceptable.	004	sustainability is unacceptable.
947	A specific reversion/recovery	994	A specific reversion/recovery
	plan must be produced for each		plan must be produced for each
	parameter change. This plan must		parameter change. This plan must
0.10	include:	00-	include:
948		995	
949	Which parameters need to change	996	Which parameters need to change

and in which ways in order to

and in which ways in order to

return to the previous state (or a similar state)

950

951 How to recover the network in the event of disastrous failure

952

953 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.

954

955 2.7. Non-Updatable Protocol Parameters

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

957

958 3. Guardrails and Guidelines on Treasury Withdrawal Actions

959 Treasury withdrawal actions specify the destination and amount of a number of withdrawals from the Cardano treasury.

960

961 GUARDRAILS

962 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 onchain governance action with a
threshold of greater than 50% of
the active voting stake

963

964 TREASURY-02a (x) Withdrawals from the Cardano Blockchain treasury made pursuant to an approved Cardano Blockchain ecosystem budget must not exceed the net change limit for the Cardano

return to the previous state (or a similar state)

997

998 How to recover the network in the event of disastrous failure

999

1000 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.

1001

1002 2.7. Non-Updatable Protocol Parameters

1003 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.

1004

1005 3. Guardrails and Guidelines on "Treasury Withdrawals" Actions

1006 "Treasury Withdrawals" actions specify the destination and amount of a number of withdrawals from the Cardano Treasury.

1007

1008 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 onchain governance action with a
threshold of greater than 50% of
the active voting stake

1010

1011 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's balance per period of time

965

966 TREASURY-03a (x) Withdrawals from the Cardano Blockchain treasury must be denominated in ada

967

968 TREASURY-04a (x) Withdrawals from the Cardano Blockchain treasury must not be ratified until there is a Cardano Community approved Cardano Blockchain ecosystem budget then in effect pursuant to a previous on-chain governance action agreed by the DReps with a threshold of greater than 50% of the active voting stake

969

- 970 4. Guardrails and Guidelines on Hard Fork Initiation Actions
- 971 The hard fork initiation action requires both a new major and a new minor protocol version to be specified.

972

973 As positive integers

974 As the result of a hard fork, new updatable protocol parameters may be introduced. Guardrails may be defined for these parameters, which will take effect following the hard fork. Existing updatable protocol parameters may also be deprecated by the hard fork, in which case the guardrails become obsolete for all future changes.

975

976 GUARDRAILS

977 HARDFORK-01 (~ - no access to existing parameter values) The major protocol version must be the same as or one greater than the major version that will be enacted immediately prior to this change. If the major protocol version is one greater, then the minor protocol version must be zero

1012

1013 TREASURY-03a (x) Withdrawals from the Cardano Blockchain treasury must be denominated in ada

1014

1015 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.

1016

- 1017 4. Guardrails and Guidelines on "Hard Fork Initiation" Actions
- 1018 The "Hard Fork Initiation" action requires both a new major and a new minor protocol version to be specified.

1019

- 1020 As positive integers
- 1021 As the result of a hard fork, new updatable protocol parameters may be introduced. Guardrails may be defined for these parameters, which will take effect following the hard fork. Existing updatable protocol parameters may also be deprecated by the hard fork, in which case the guardrails become obsolete for all future changes.

1022

- 1023 GUARDRAILS
- 1024 HARDFORK-01 (~ no access to existing parameter values) The major protocol version must be the same as or one greater than the major version that will be enacted immediately prior to this change. If the major protocol version is one greater, then the minor protocol version must be zero

978

979 HARDFORK-02a (~ - no access to existing parameter values) Unless the major protocol version is also changed, the minor protocol version must be greater than the minor version that will be enacted immediately prior to this change

980

981 HARDFORK-03 (\sim - no access to existing parameter values) At least one of the protocol versions (major or minor or both) must change

982

983 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

984

985 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

986

987 HARDFORK-06 (x) Settings for any new protocol parameters that are introduced with a hard fork must be included in the appropriate Genesis file

988

989 HARDFORK-07 (x) Any deprecated protocol parameters must be indicated in this Appendix

990

991 HARDFORK-08 (\sim - 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

992

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

1026 HARDFORK-02a (~ - no access to existing parameter values) Unless the major protocol version is also changed, the minor protocol version must be greater than the minor version that will be enacted immediately prior to this change

1027

1028 HARDFORK-03 (~ - no access to existing parameter values) At least one of the protocol versions (major or minor or both) must change

1029

1030 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

1031

1032 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

1033

1034 HARDFORK-06 (x) Settings for any new protocol parameters that are introduced with a hard fork must be included in the appropriate Genesis file

1035

1036 HARDFORK-07 (x) Any deprecated protocol parameters must be indicated in this Appendix

1037

1038 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

1039

1040 5. Guardrails and Guidelines on "Update Committee" actions

or Threshold governance actions may change the size, composition or required voting thresholds for the Constitutional Committee.

995

996 GUARDRAILS

997 UPDATE-CC-01a (x) Update

Constitutional Committee and/or

threshold and/or term governance

actions must not be ratified

until ada holders have ratified

through an on-chain governance

action this Constitution

998

- 999 6. Guardrails and Guidelines on New Constitution or Guardrails Script Actions
- 1000 New constitution or Guardrails

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

1001

1002 GUARDRAILS

1003 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

1004

1005 NEW-CONSTITUTION-02 (x) If specified, the new Guardrails Script must be consistent with this Constitution

1006

- 7. Guardrails and Guidelines on No Confidence Actions
- 1008 No confidence actions signal a state of no confidence in the governance system. No guardrails are imposed on No Confidence actions.

1009

- 1010 GUARDRAILS
- 1011 None
- 1012 8. GUARDRAILS AND GUIDELINES ON INFO ACTIONS

1041 "Update Committee" actions may change the size, composition or required voting thresholds for the Constitutional Committee.

1042

- 1043 GUARDRAILS
- 1044 UPDATE-CC-01a (x) "Update

 Committee" actions must not be
 ratified until ada holders have
 ratified through an on-chain
 governance action this
 Constitution

1045

- 1046 6. Guardrails and Guidelines on "New Constitution" actions
- 1047 "New Constitution" actions change the hash of the on-chain Constitution and the associated Guardrails Script.

1048

- 1049 GUARDRAILS
- 1050 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

1051

1052 NEW-CONSTITUTION-02 (x) If specified, the new Guardrails Script must be consistent with this Constitution

1053

- 1054 7. Guardrails and Guidelines on "No Confidence" actions
- 1055 "No Confidence" actions signal a state of no confidence in the governance system. No guardrails are imposed on "No Confidence" actions.

- 1057 GUARDRAILS
- 1058 None
- 1059 **8.** Guardrails and Guidelines on "Info" actions

1013	<pre>Info actions are not enacted on- chain. No guardrails are imposed</pre>	1060	"Info" actions are not enacted on-chain. No guardrails are
	on Info actions.		imposed on Info actions.
1014		1061	
1015	GUARDRAILS	1062	GUARDRAILS
1016	None	1063	None
1017	9. List of Protocol Parameter	1064	9. List of Protocol Parameter
	Groups		Groups
1018	The protocol parameters are	1065	The protocol parameters are
	grouped by type, allowing		grouped by type, allowing
	different thresholds to be set		different thresholds to be set
	for each group.		for each group.
1019		1066	
1020	The network parameter group	1067	The network parameter group
	consists of:		consists of:
1021		1068	
1022	maximum block body size	1069	maximum block body size
	(maxBlockBodySize)		(maxBlockBodySize)
1023		1070	
1024	maximum transaction size	1071	maximum transaction size
	(maxTxSize)		(maxTxSize)
1025		1072	
1026	maximum block header size	1073	maximum block header size
	(maxBlockHeaderSize)		(maxBlockHeaderSize)
1027		1074	
1028	maximum size of a serialized	10/5	maximum size of a serialized
1020	asset value (maxValueSize)	1076	asset value (maxValueSize)
1029	maximum script execution units in	1076	maximum script execution units in
1020	a single transaction	1077	a single transaction
	<pre>(maxTxExecutionUnits[steps])</pre>		<pre>(maxTxExecutionUnits[steps])</pre>
1031	(maxixExecutionomits[steps])	1078	(maxixExecutionomits [steps])
	maximum script execution units in	1079	maximum script execution units in
1002	a single block	1073	a single block
	<pre>(maxBlockExecutionUnits[steps])</pre>		<pre>(maxBlockExecutionUnits[steps])</pre>
1033	(1080	(
1034	maximum number of collateral		maximum number of collateral
	<pre>inputs (maxCollateralInputs)</pre>		<pre>inputs (maxCollateralInputs)</pre>
1035	·	1082	·
1036	The economic parameter group	1083	The economic parameter group
	consists of:		consists of:
1037		1084	
1038	minimum fee coefficient	1085	minimum fee coefficient
	(txFeePerByte)		(txFeePerByte)
1039		1086	
1040	<pre>minimum fee constant (txFeeFixed)</pre>	1087	<pre>minimum fee constant (txFeeFixed)</pre>
1041		1088	
1042	minimum fee per byte for	1089	minimum fee per byte for
	reference scripts		reference scripts
	<pre>(minFeeRefScriptCoinsPerByte)</pre>		<pre>(minFeeRefScriptCoinsPerByte)</pre>
1043		1090	

1044	delegation key lovelace deposit	1091	delegation key lovelace deposit
	(stakeAddressDeposit)		(stakeAddressDeposit)
1045		1092	
1046	pool registration lovelace	1093	pool registration lovelace
	deposit (stakePoolDeposit)		deposit (stakePoolDeposit)
1047		1094	
1048	,	1095	
	(monetaryExpansion)		(monetaryExpansion)
1049		1096	
	treasury expansion (treasuryCut)		treasury expansion (treasuryCut)
1051	minimum filmed managed and film	1098	minimum filmed manager and film
1052	minimum fixed rewards cut for	1099	
1052	pools (minPoolCost)	1100	pools (minPoolCost)
1053	minimum lovalage denseit non hyte	1100	minimum loveless deposit non hyte
1054		1101	minimum lovelace deposit per byte
	of serialized UTx0		of serialized UTx0
1055	(coinsPerUTx0Byte)	1102	(coinsPerUTx0Byte)
1055	prices of Plutus execution units		prices of Dlutus execution units
1020	(executionUnitPrices[priceSteps/p	1103	<pre>prices of Plutus execution units (executionUnitPrices[priceSteps/p</pre>
	riceMemory])		riceMemory])
1057	r reenemory]/	1104	Titlerielliot y])
	The technical/security parameter		The technical/security parameter
1030	group consists of:	1103	group consists of:
1059	group consists or:	1106	group consists or:
1060	pool pledge influence	1107	pool pledge influence
1000	(poolPledgeInfluence)	1107	(poolPledgeInfluence)
1061	(pooti toagoziii taciico,	1108	(pooti toagoziii taciioc,
	pool retirement maximum epoch		pool retirement maximum epoch
	(poolRetireMaxEpoch)		(poolRetireMaxEpoch)
1063		1110	
1064	desired number of pools	1111	desired number of pools
	(stakePoolTargetNum)		(stakePoolTargetNum)
1065		1112	
1066	Plutus execution cost models	1113	Plutus execution cost models
	(costModels)		(costModels)
1067		1114	
1068	proportion of collateral needed	1115	proportion of collateral needed
	for scripts		for scripts
	(collateralPercentage)		(collateralPercentage)
1069		1116	
1070	The governance parameter group	1117	The governance parameter group
	consists of:		consists of:
1071		1118	
1072	governance voting thresholds	1119	governance voting thresholds
	(dRepVotingThresholds[],		(dRepVotingThresholds[],
	<pre>poolVotingThresholds[])</pre>		<pre>poolVotingThresholds[])</pre>
1073		1120	
1074		1121	governance action maximum
	lifetime in epochs		lifetime in epochs
a c = -	(govActionLifetime)	4400	(govActionLifetime)
1075		1122	

	<pre>governance action deposit* (govActionDeposit)</pre>		<pre>governance action deposit* (govActionDeposit)</pre>
1077		1124	
	DRep deposit amount (dRepDeposit)		DRep deposit amount (dRepDeposit)
1079		1126	
1080	DRep activity period in epochs (dRepActivity)	1127	DRep activity period in epochs (dRepActivity)
1081		1128	
	<pre>minimal constitutional committee size (committeeMinSize)</pre>		<pre>minimal constitutional committee size (committeeMinSize)</pre>
1083		1130	
1084	maximum term length (in epochs) for the constitutional committee members (committeeMaxTermLength)	1131	maximum term length (in epochs) for the constitutional committee members (committeeMaxTermLength)
1085	members (committeenaxiermeength)	1132	members (committeenaxiermeength)
1086	APPENDIX II: SUPPORTING GUIDANCE	1133	APPENDIX II. SUPPORTING GUIDANCE
	This Appendix II is intended to provide guidance in interpreting the Constitution and the Constitutional Committee shall consider this Appendix II as it deems relevant and useful in carrying out its constitutional duties.		This Appendix II is intended to provide guidance in interpreting the Constitution and the Constitutional Committee shall consider this Appendix II as it deems relevant and useful in carrying out its constitutional duties.
1088 1089	1. Framing Notes	1135 1136	1. Framing Notes
1090	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 presently a decentralized ecosystem of blockchain technology, smart contracts, and community governance.	1137	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.
1091		1138	

the Cardano Community recognizes

that this is not a constitution

for only a blockchain but rather

the Cardano Community recognizes

that it must be remembered that

this is not a constitution for

only a blockchain but rather a constitution for a blockchain ecosystem — a much more ambitious endeavor. 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 radically new approaches to human interaction and collaboration.

1093

1094 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 to act as the voice of ada owners for on-chain voting.

1095

1096 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.

1097

1098 2. Other Guidance

1099 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 onchain ratification of the Constitution. So long as any such published guidance has been

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.

1140

1141 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.

1142

1143 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.

1144

1145 2. Other Guidance

1146 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 onchain 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. 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.