

List of changes from v2.3 to v2.4.pdf

— 50 removals

1968 lines

```
1  **CARDANO BLOCKCHAIN ECOSYSTEM
   CONSTITUTION**
2  =====
   =====
3
4  **PREAMBLE**
5  -----
6
7  Cardano is a decentralized
   ecosystem of blockchain
   technology, smart
8  contracts, and community
   governance, committed to
   improving economic,
9  political, and social systems for
   everyone, everywhere. By offering
   this
10 foundational infrastructure,
   Cardano empowers individuals and
11 communities to manage their
   identity, value, and governance,
   fostering
12 the emergence of decentralized
   applications, businesses, and
   network
13 states.
14
15 Through unbiased processing of
   immutable data, we, the
   participants of
16 the Cardano Community, consisting
   of individuals, organizations,
17 contributors, and others, choose
   to follow in the footsteps of the
   early
18 Internet and cryptocurrency
   pioneers, who first forged bonds
   of
19 community through digital
   technologies. We are guided by
   our shared
```

+ 43 additions

1962 lines

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20 principles and tenets as we
exercise our self-governance by
balancing
21 decentralized decision-making
with accountability and
safeguarding the
22 security of the Cardano
Blockchain.
23
24 Recognizing the need for a more
robust and dynamic governance
framework,
25 that neither relies nor depends
upon traditional nation-state
governance
26 systems, but instead relies on
self-governance by the Cardano
Community,
27 utilizing, wherever possible and
beneficial, blockchain technology
in
28 the governance process, we hereby
establish this Cardano
Constitution to
29 govern the Cardano Blockchain
ecosystem, ensure the continuity
of the
30 Cardano Blockchain, and guard the
rights of those who utilize it
and the

31 rights of Ada Holders.

32
33 With these purposes in mind, we,
the Cardano Community, affirm our
34 intention to abide by this
Constitution in order to
participate in the
35 governance of the Cardano
Blockchain ecosystem. We invite
all who share
36 our values to join us for as long
as they wish, while honoring the
37 freedom to take another path.

38
39 **DEFINED TERMS**
40 -----

41
42 1. Active Voting Stake. The
total amount of lovelace that is
delegated

20 principles and tenets as we
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total amount of lovelace that is
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43 to active DReps or SPOs. This
44 stake is used as the basis for
calculating voting thresholds
and adjudicating proposed
Governance
45 action outcomes. It excludes
stake delegated to inactive
DReps, the
46 predefined abstain voting
option, unregistered stake, and
registered
47 undelegated stake.
48

49 2. Ada Holders. Persons who
directly control the private
key(s) to ada
50 token(s).
51

52 3. Cardano Community. The
collective group of all
individuals and

53 organizations that, in
embracing the shared principles
and

54 objectives set forth in the
Cardano Blockchain Ecosystem

55 Constitution, own ada,
develop, build on, support,
maintain,

56 contribute to, and use the
Cardano Blockchain.
57

58 4. Cardano Community Member. Any
participant, individual or

59 organization in the Cardano
Community, including the CC.
60

61 5. Constitutional Committee
(CC). The governing body and its
component

62 elected seats charged with
ensuring that applicable
governance

63 actions take effect on the
Cardano Blockchain only if in
alignment

64 with the principles and
provisions set forth in the
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65 Blockchain Ecosystem
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67 **6.** Constitutional Committee
member (CC member). A person,
whether an

68 individual or organization,
that serves as a member of the

69 Constitutional Committee.

70

71 **7.** Delegated Representative
(DRep). The individual or entity
registered

72 to vote with respect to on-
chain governance actions on its
own

73 behalf or on behalf of other
Ada Holders.

74

75 **8.** Net Change Limit. The maximum
allowed amount or percentage of

76 lovelace that may be removed
from the Cardano Treasury in a
given

77 period.

78

79 **9.** Stake Pool Operator (SPO). An
individual or entity that
controls

80 cold key(s) of a block-
producing node of a Stake Pool.

81

82 **10.** Stake Pool. A Stake Pool
Operator's block producing node,
identified

83 by a unique Stake Pool ID,
which aggregates applicable
Delegator

84 stake, forges and validates
Blocks, and facilitates
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85 the SPO to the Cardano
Blockchain's security,
decentralization,

86 consensus mechanism, and
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Blockchain's security,
decentralization,

83 consensus mechanism, and
governance process.

84

88 11. Treasury Withdrawal
Recipient. A person or entity who
is indicated as

89 the recipient of ada from the
Cardano Treasury in the relevant
90 "Treasury Withdrawals"
action.

91

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

93 -----

94

95 ### **Section 1 Guiding Tenets**

96

97 The following Tenets shall guide
all Cardano Community members and
98 proposed governance actions shall
be evaluated in accordance with
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99 Tenets. The order in which the
Tenets below appear is not
intended to

100 represent a priority among
Tenets.

101

102 TENET 1 Transactions on the
Cardano Blockchain shall not be
slowed down

103 or censored and shall be
expediently served for their
intended purpose.

104

105 TENET 2 The cost of transactions
on the Cardano Blockchain shall
be

106 predictable and not unreasonable.

107

108 TENET 3 Anyone desiring to
develop and deploy applications
on the

109 Cardano Blockchain shall not be
unreasonably prevented from
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110 and deploying such applications
as intended.

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112 TENET 4 Contributions by the
Cardano Community on the Cardano
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114 with SPOs, potential compensation
to DReps and CC members, and
115 appropriate tokenomics.
116

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

119
120 TENET 6 The Cardano Blockchain
shall not unreasonably impede
121 interoperability.
122

123 TENET 7 The Cardano Blockchain
shall preserve in a safe manner
any value
124 and information stored on the
Cardano Blockchain.
125

126 TENET 8 The Cardano Blockchain
shall not unreasonably spend
resources.
127

128 TENET 9 All users of the Cardano
Blockchain shall be treated
fairly and
129 impartially, taking into account
the collective desires of the
Cardano
130 Community, consistent with the
long-term sustainability and
viability of
131 the Cardano Blockchain.
132

133 TENET 10 The Cardano Blockchain's
monetary system shall promote
134 financial stability. This shall
include seeking to preserve the
value
135 and utility of ada as a medium of
exchange, store of value, and
unit of
136 account. The total supply of ada
shall not exceed 45,000,000,000
137 (45,000,000,000,000,000
lovelace).
138

139 ### **Section 2 Implementation of
Guardrails**

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111 with SPOs, potential compensation
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135

136 ### **Section 2 Implementation of
Guardrails**

140
141 1. The Cardano Blockchain shall
operate in accordance with the
Cardano
142 Blockchain Guardrails
Appendix to this Constitution.
The Cardano
143 Community may digitally
codify certain Guardrails such
that the
144 Guardrails are directly
programmed and implemented on the
Cardano
145 Blockchain using on-chain
Guardrails Script or built-in
ledger
146 rules.
147
148 2. In the event there are
inconsistencies between a
Guardrail as set
149 forth in the Cardano
Blockchain Guardrails Appendix
and any such
150 Guardrail that has been
programmed and implemented on the
Cardano
151 Blockchain, the version of
such Guardrail that has been
deployed
152 directly on the Cardano
Blockchain shall prevail unless
and until
153 replaced or revised pursuant
to an on-chain governance action.
The
154 CC shall seek to reconcile
such inconsistencies through the
155 encouragement of an
appropriate on-chain governance
action.
156
157 **ARTICLE II. COMMUNITY AND
GOVERNANCE**
158 -----

159
160 ### **Section 1 The Cardano
Community**
161
162 1. No formal membership shall be
required to use, participate in

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157 ### **Section 1 The Cardano
Community**
158
159 1. No formal membership shall be
required to use, participate in

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163 benefit from the Cardano
Blockchain.
164 Cardano Community members are
entitled to the rights,
privileges,
165 and protections of this
Constitution, and are accordingly
expected
166 to support and uphold this
Constitution, maintain the
integrity of
167 the ecosystem, participate in
governance, and resolve disputes
168 transparently.
169
170 2. Cardano Community members are
encouraged to collaborate on
171 developing applications and
to form organizations that
support the
172 Cardano Blockchain and the
Cardano Community.
173
174 **### **Section 2 Participation
Rights of Ada Holders****
175
176 **1. Ada Holders are entitled to
access and participate in the on-
chain**
177 decision-making processes of
the Cardano Blockchain ecosystem,
178 including voting, proposing
changes to the governance
structure in
179 accordance with the
Guardrails, and otherwise taking
part in
180 on-chain governance actions.
181
182 **2. Ada Holders can directly
participate in governance actions
by**
183 registering as DReps
themselves or by delegating their
voting
184 rights to other registered
DReps.
185

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160 benefit from the Cardano
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Cardano Community.
170
171 **### **Section 2 Participation
Rights of ada owners****
172
173 **1. Ada owners are entitled to
access and participate in the on-
chain**
174 decision-making processes of
the Cardano Blockchain ecosystem,
175 including voting, proposing
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structure in
176 accordance with the
Guardrails, and otherwise taking
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178
179 **2. Ada owners can directly
participate in governance actions
by**
180 registering as DReps
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voting
181 rights to other registered
DReps.
182

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

188

189 4. Any Ada Holder shall be
allowed to delegate their voting
stake to

190 one or more registered DReps,
including themselves.

191

192 5. Ada Holders shall be allowed
to change the delegation of their
193 voting stake at any time.
194

195 6. Ada Holders who use third-
party custodians or other
designees to hold

196 their ada may authorize or
withhold authorization from, such

197 third parties to vote or
delegate the Ada Holders' voting
rights to

198 registered DReps on the Ada
Holders' behalf.

199

200 7. Ada Holders have the right to
a process for participating in,

201 submitting and voting on on-
chain governance actions that is
202 open, transparent, and
protected from undue influence
and

203 manipulation.

204

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

206

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

208 model that, where beneficial,
uses smart contracts and other

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DRep may
184 act in the interest of one or
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designees to

193 hold their ada may authorize,
or may withhold authorization
for,

194 such third-parties to vote on
their behalf, and to delegate the

195 voting rights of the ada
owner to registered DReps on the
owner's

196 behalf.

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ensure
210 transparency.
211
212 2. Three independent voting
bodies – DReps, SPOs, and the
213 CC – participate in on-chain
voting; anyone holding multiple
roles
214 must publicly disclose such
overlaps before engaging in any
215 on-chain governance actions.
216
217 ### **Section 4 Delegated
Representatives**
218
219 1. DReps have voting power equal
to the number of lovelace
delegated to
220 them.
221
222 2. DReps may vote on all types
of governance actions.
223
224 3. DReps shall ensure that any
compensation received in
connection with
225 their activities as a DRep is
publicly disclosed in a timely
226 manner through relevant
governance communication
channels.
227
228 4. DReps shall not offer or
provide compensation to an Ada
Holder in
229 exchange for being appointed
as a DRep or for voting on their
behalf.
230
231 ### **Section 5 Stake Pool
Operators**
232
233 1. SPOs shall vote on the
following governance actions: "No
Confidence",
234 "Update Committee", "Hard
Fork Initiation", "Parameter
Update" that

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following governance actions: "No
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232 "Update Committee", "Hard
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235 affect security-relevant
236 parameters, and "Info" actions.
237 ### **Section 6 Governance Action
238 Standards**
239 1. To ensure transparency in on-
240 chain governance, proposed
241 governance
242 actions shall follow a
243 standardized and legible format
244 before
245 being recorded or enacted on-
246 chain. This format shall include
247 a
248 URL hosting a document that
249 outlines additional context for
250 the
251 proposed governance action,
252 and the hash of this document.
253 The
254 document hosted by such a URL
255 shall be immutable and incapable
256 of
257 being altered after
258 submission, and the content of
259 every on-chain
260 Governance Action must be
261 identical to the final off-chain
262 version
263 of the proposed action.
264
265 2. Each proposal shall provide
266 sufficient rationale, including
267 at
268 minimum: a title, abstract,
269 justification, and relevant
270 supporting
271 materials.
272
273 3. "Hard Fork Initiation" and
274 "Parameter Update" actions shall
275 undergo sufficient technical
276 review and scrutiny as mandated
277 by
278 the Guardrails to ensure that
279 the governance action does not
280 endanger the security,
281 functionality, performance, or
282 long-term
283 sustainability of the Cardano
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281 sustainability of the Cardano
282 Blockchain.

258
259 ### **Section 7 "Treasury
Withdrawals" Action Standards**
260
261 A "Treasury Withdrawals" action
must, in addition to the
262 requirements at Section 6, meet
all of the following
requirements:
263
264 1. "Treasury Withdrawals"
actions must specify the terms of
265 the withdrawal. This shall
include: the purpose of the
withdrawal,
266 the period for delivery of
proposed activities which the
withdrawal
267 shall be used for, the
relevant costs and expenses of
the proposed
268 activities, circumstances
under which the withdrawal might
be
269 refunded to the Cardano
Treasury.
270
271 2. "Treasury Withdrawals"
actions shall disclose whether
the
272 prospective recipient of the
"Treasury Withdrawals" action
273 has received ada from the
Cardano Treasury within the last
24
274 months.
275
276 3. A Net Change Limit must be
set. "Treasury Withdrawals"
actions
277 must not exceed the Net
Change Limit for that period.
278
279 4. All "Treasury Withdrawals"
actions shall specify a process
280 for oversight of use of funds
received from the Cardano
Treasury

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set. "Treasury Withdrawals"
actions
275 must not exceed the Net
Change Limit for that period.
276
277 4. "Treasury Withdrawals"
actions shall require an
allocation of ada
278 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.

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

285
286 5. "Treasury Withdrawals"
actions shall designate one or
more
287 administrators responsible
for monitoring how the funds are
used,
288 and ensuring the deliverables
are achieved.
289
290 6. Any ada received from a
Cardano Blockchain treasury
withdrawal,
291 so long as such ada is being
held by an administrator prior to
292 further disbursement to the
Treasury Withdrawal Recipient,
293 must be kept in one or more
separate accounts that can be
294 audited by the Cardano
Community, and such accounts
shall not
295 be delegated to an SP0 but
must be delegated to the
predefined
296 abstain voting option.

297
298 ****ARTICLE III. CONSTITUTIONAL
COMMITTEE****

299 -----

300
301 **### **Section 1 Role and Scope****
302
303 1. A CC shall be established as
the branch of Cardano's on-chain
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305 on-chain are consistent with
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307 2. Each CC member shall have one
vote.

308

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

312

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

316

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

318

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

322 **Holders.**

323

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

326

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

328

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

331 In a state of no confidence,
members of the then-standing CC
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members of the then-standing CC
must

332 be reinstated or replaced
using the "Update Committee"
action
333 before any other on-chain
governance action, other than
"Info"
334 actions, may go forward.
335
336 2. The Cardano Community shall
establish and make public a
process from
337 time to time for election of
members of the CC consistent with
the
338 requirements of the
Guardrails.
339
340 3. In the event of a vote of no
confidence or the removal of some
CC
341 members by "Update Committee"
action, an election shall be held
as
342 soon as practical.
343
344 ~~***~~ ~~**Section 4 Transparency and~~
~~Conduct**~~
345
346 1. CC processes shall be
transparent, and the CC shall
publish each
347 decision.
348
349 2. When voting that a governance
action proposed to be executed
350 on-chain is unconstitutional,
each CC member casting such a
vote
351 shall set forth the basis for
its decision with reference to
352 specific Articles of this
Constitution or provisions of the
353 Cardano Blockchain Guardrails
Appendix that are in conflict
with a
354 given proposal.
355
356 3. CC members may be compensated
for their efforts as members and
shall
357 ensure that any compensation
received in connection with such

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358 activities is disclosed in a
timely manner through relevant
359 governance communication
channels.
360
361 ****ARTICLE IV. AMENDMENT PROCESS****
362 -----
363
364 **### **Section 1 Amendment Rules****
365
366 Amendments to this Constitution,
including the Cardano Blockchain
367 Guardrails Appendix, shall
require approval via an on-chain
governance
368 action supported by at least 65%
of the active voting stake at
that
369 time, unless a different
threshold is expressly provided
in the Cardano
370 Blockchain Guardrails Appendix
for the amendment of a particular
371 Guardrail, in which case that
threshold shall apply.
372
373 ****APPENDIX I. CARDANO BLOCKCHAIN
GUARDRAILS****
374 -----

375
376 **### **1. Introduction****
377
378 To implement Cardano Blockchain
on-chain governance, it is
necessary to
379 establish sensible Guardrails
that will enable the Cardano
Blockchain to
380 continue to operate in a secure
and sustainable way.
381
382 This Appendix sets forth
Guardrails that must be applied
to Cardano
383 Blockchain on-chain governance
actions, including changes to the
384 protocol parameters and limits on
treasury withdrawals. These
Guardrails
385 cover both essential, intrinsic
limits on settings, and

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378 protocol parameters and limits on
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379 cover both essential, intrinsic
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recommendations

386 that are based on experience,
research, measurement, and
governance

387 objectives.

388

389 These Guardrails are designed to
avoid both unexpected and
foreseeable

390 problems with the operation of
the Cardano Blockchain. They are
intended

391 to guide the choice of sensible
parameter settings and avoid
potential

392 problems with security,
performance, functionality, or
long-term

393 sustainability. As described
below, some of these Guardrails
are

394 automatable and will be enforced
via an on-chain Guardrails Script
or

395 built-in ledger rules.

396

397 These Guardrails apply only to
the Cardano Blockchain Layer 1
mainnet

398 environment. They are not
intended to apply to test
environments or to

399 other blockchains that use
Cardano Blockchain software.

400

401 Not all parameters for the
Cardano Blockchain can be
considered

402 independently. Some parameters
interact with other settings in
an

403 intrinsic way. Where known, these
interactions are addressed in
this

404 Appendix.

405

406 While the Guardrails in this
Appendix presently reflect the
current

407 state of technical insight, this
Appendix should be treated as a
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409 evaluation results for the
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410 restrictions contained in these
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tightened in
411 due course.
412
413 Additional Guardrails may also be
needed where, for example, new
414 protocol parameters are
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415
416 ##### **Amending, Adding or
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417
418 The Guardrails set forth in this
Appendix may be amended from time
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422 amendment to the Constitution
itself, including any new
Guardrails. Each
423 Guardrail has a unique label. If
the text of a Guardrail is
amended, the
424 existing Guardrail will be
deprecated and a new label will
be used in
425 this Appendix. Similarly, if a
Guardrail is deprecated, its
label will
426 never be reused in the future. In
all cases, the Guardrails that
apply
427 to a governance action will be
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the
428 governance action is submitted
on-chain, regardless of any later
429 amendments.

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430
431 ##### **Terminology and Guidance**
432
433 This section provides
supplementary definitions and
interpretive
434 guidance for terms used
throughout this Constitution and
the Guardrails
435 Appendix.
436
437 Cardano Blockchain. The
decentralized, public, peer-to-
peer,
438 proof-of-stake distributed ledger
system, designed to securely
record,
439 verify, and synchronize
transactions and data across the
network while
440 enabling the execution of smart
contracts and decentralized
441 applications. This system,
powered by ada, is the longest
chain of
442 blocks with sufficient
confirmations to be considered
finalized starting
443 from block Hash
444 5f20df933584822601f9e3f8c024eb5eb
252fe8cefb24d1317dc3d432e940ebb,
as
445 forged on 2017-09-23 21:44:51 UTC
on the Cardano Network.
446
447 Block. A container of data
produced by a Stake Pool that
includes, at
448 minimum, a header. Block
production and block forging are
used
449 interchangeably.
450
451 Protocol. The algorithms, rules,
and procedures that govern the
exchange
452 of information on the Cardano
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453
454 Protocol Parameters. Protocol
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455 Blockchain functions; modifiable
through applicable governance
456 processes.
457
458 Slot. The smallest denomination
of time nested within an Epoch.
459
460 Epoch. A Protocol-determined
interval characterized by a fixed
number of
461 Slots. Each Slot's duration and
sequence are governed by the
462 blockchain's consensus mechanisms
and are associated with a
universal
463 timestamp defined in UTC. It is
used for operations including
governance
464 voting, Block production
leadership determination, rewards
calculation,
465 and Hard Forks.
466
467 lovelace. The smallest unit of
value for the native
cryptocurrency of
468 the Cardano Blockchain, utilized
for the network's security and
469 governance. It is distinguished
from other native tokens by its
lack of
470 a policy ID and policy name.
471
472 ada. A superunit of lovelace,
with 1 ada equal to 1,000,000
lovelace.
473
474 Delegator. A private key holder
that delegates stake to a Stake
Pool for
475 block production and network
security, to a DRep for
participation in
476 on-chain governance, or both. In
doing so, the delegator
contributes to
477 the operation and governance of
the Cardano Blockchain.
478
479 Active Block Production Stake.
The cumulative amount of stake,
measured

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473 Active Block Production Stake.
The cumulative amount of stake,
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480 in lovelace, that is actively
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481 block forging during the current
Epoch. This amount is determined
by a
482 snapshot of stake distribution
taken at the beginning of the
previous
483 Epoch, ensuring that it
accurately represents the
effective stake
484 available for securing and
maintaining the Cardano
Blockchain through
485 block forging.
486
487 On-chain. A classification for
actions, transactions, or
governance
488 activities that are executed,
recorded, or implemented directly
on the
489 Cardano Blockchain. These
actions, transactions, or
governance
490 activities are permanently
validated and stored through the
blockchain's
491 consensus mechanism, ensuring
their immutability and
transparency.
492
493 Off-Chain. A classification for
activities, proposals, or
governance
494 decisions that are either not yet
implemented on the Cardano
Blockchain,
495 or not intended to be directly
recorded on the blockchain. These
may
496 include discussions, proposals,
or agreements that exist outside
the
497 blockchain and do not involve
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498
499 Governance Action. An on-chain
proposal enabling participation
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500 shaping the future of the Cardano
Blockchain Ecosystem through
voting
501 transactions.
502
503 Hard Fork. A Protocol upgrade for
the Cardano Blockchain that
results in
504 a new Protocol version and
necessitates coordinated adoption
by network
505 participants.
506
507 Guardrails. A set of restrictions
on Governance Actions to prevent
508 undesirable outcomes and assist
voters in deciding whether the
proposed
509 action complies with the Cardano
Blockchain Ecosystem
Constitution. Some
510 guardrails are enforced using the
Guardrails Script or ledger rules
to
511 prevent submission of the action,
while others necessitate further
512 adjudication to determine if they
violate the Constitution in ways
the
513 Guardrails Script or ledger
cannot check. Guardrails may be
either
514 mandatory ("must"/"must not") or
advisory ("should"/"should not").
The
515 latter allows for interpretive
flexibility where necessary.
516
517 Guardrails Script. A smart
contract script that checks
specific proposed
518 Governance Actions, "Hard Fork
Initiation" and "Parameter
Update"
519 actions, against automatically
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is applied
520 when the Governance Action is
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521
522 Motion of no confidence
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Confidence" action). A
523 motion to create a state of no
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524 committee.
525
526 Update committee and/or threshold
and/or terms governance action
527 ("Update Committee" action).
Changes to the members of the
528 Constitutional Committee and/or
to its signature threshold and/or
terms.
529
530 New Constitution or Guardrails
Script governance action ("New
531 Constitution" action). A
modification to the Constitution
or Guardrails
532 Script, recorded as on-chain
hashes.
533
534 Hard Fork Initiation governance
action ("Hard Fork Initiation"
action).
535 Triggers a non-backwards
compatible upgrade of the
network; requires a
536 prior software upgrade.
537
538 Protocol Parameter Changes
governance action ("Parameter
Changes" action
539 or "Parameter Update" action).
Any change to one or more
updatable
540 protocol parameters, excluding
changes to major protocol
versions
541 ("hard forks").
542
543 Treasury Withdrawals governance
action ("Treasury Withdrawals"
action).
544 Withdrawals from the treasury.
545
546 Info action ("Info" action). An
action that has no effect on-
chain,
547 other than an on-chain record.
548

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542

549 Cardano Blockchain Treasury,
Cardano Treasury, or Treasury. A
supply of
550 ada controlled by the Protocol of
the Cardano Blockchain; collected
from
551 transaction fees, reserves, and
other designated sources.
Withdrawals
552 from this supply of ada are
subject to the processes and
restrictions
553 set forth in the Cardano
Blockchain Ecosystem
Constitution.
554
555 Cardano Blockchain Ecosystem. The
collective ecosystem comprising
the
556 Cardano Blockchain, the Cardano
Community, and the tooling and
557 infrastructure utilized by the
Cardano Community to support the
Cardano
558 Blockchain in alignment with the
shared principles and objectives
set
559 forth in the Cardano Blockchain
Ecosystem Constitution.
560
561 Expected. A reasonable
presumption that the identified
action, although
562 not mandatory, will occur.
563
564 Should/Should not. Where this
Appendix says that a value
"should not"
565 be set below or above some value,
this means that the Guardrail is
a
566 recommendation or guideline, and
the specific value could be open
to
567 discussion or alteration by a
suitably expert group recognized
by the
568 Cardano Community in light of
experience with the Cardano
Blockchain
569 governance system or the
operation of the Cardano

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553 forth in the Cardano Blockchain
Ecosystem Constitution.
554
555 Expected. A reasonable
presumption that the identified
action, although
556 not mandatory, will occur.
557
558 Should/Should not. Where this
Appendix says that a value
"should not"
559 be set below or above some value,
this means that the Guardrail is
a
560 recommendation or guideline, and
the specific value could be open
to
561 discussion or alteration by a
suitably expert group recognized
by the
562 Cardano Community in light of
experience with the Cardano
Blockchain
563 governance system or the
operation of the Cardano

Blockchain.

570

571 Must/Must not. Where this
Appendix says that a value "must"
or "must

572 not" be set below or above some
value, this means that the
Guardrail is

573 a requirement that will be
enforced by Cardano Blockchain
ledger rules,

574 types or other built-in
mechanisms where possible, and
that if not

575 followed could cause a protocol
failure, security breach or other
undesirable outcome.

577

578 Benchmarking. Benchmarking refers
to careful system level
performance

579 evaluation that is designed to
show **a priori** that, for
example, 95% of

580 blocks will be diffused across a
global network of Cardano
Blockchain

581 nodes within the required 5s time
interval in all cases. This may

582 require construction of specific
test workflows and execution on a
large

583 test network of Cardano
Blockchain nodes, simulating a
global Cardano

584 Blockchain network.

585

586 Performance analysis. Performance
analysis refers to projecting
theoretical performance,
empirical benchmarking or
simulation results to

588 predict actual system behavior.
For example, performance results
obtained from tests in a
controlled test environment (such
as a

590 collection of data centers with
known networking properties) may
be

591 extrapolated to inform likely
performance behavior in a real

Blockchain.

564

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Appendix says that a value "must"
or "must

566 not" be set below or above some
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Cardano

592 Blockchain network environment.

593

594 Simulation. Simulation refers to
synthetic execution that is
designed to

595 inform performance/functionality
decisions in a repeatable way.

For

596 example, the IOSim Cardano
Blockchain module allows the
operation of the

597 networking stack to be simulated
in a controlled and repeatable
way,

598 allowing issues to be detected
before code deployment.

599

600 Performance Monitoring.

Performance monitoring involves
measuring the

601 actual behavior of the Cardano
Blockchain network, for example,
by using

602 timing probes to evaluate round-
trip times, or test blocks to
assess

603 overall network health. It
complements benchmarking and
performance

604 analysis by providing information
about actual system behavior that

605 cannot be obtained using
simulated workloads or
theoretical analysis.

606

607 Reverting Changes. Where
performance monitoring shows that
actual

608 network behavior following a
change is inconsistent with the
performance

609 requirements for the Cardano
Blockchain, then the change must
be

610 reverted to its previous state if
that is possible. For example, if
the

611 block size is increased from
100KB to 120KB and 95% of blocks
are no

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602 network behavior following a
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603 requirements for the Cardano
Blockchain, then the change must
be

604 reverted to its previous state if
that is possible. For example, if
the

605 block size is increased from
100KB to 120KB and 95% of blocks
are no

612 longer diffused within 5s, then a
613 change must be made to revert the
614 block size to 100KB. If this is
615 not possible, then one or more
616 alternative changes must be made
617 that will ensure that the
618 performance
619 requirements are met.
620
621 Severity Levels. Issues that
622 affect the Cardano Blockchain
623 network are
624 classified by severity level,
625 where:
626
627 - Severity 1 is a critical
628 incident or issue with very high
629 impact to
630 the security, performance,
631 functionality or sustainability
632 of the
633 Cardano Blockchain network
634
635 - Severity 2 is a major
636 incident or issue with
637 significant impact to
638 the security, performance,
639 functionality or sustainability
640 of the
641 Cardano Blockchain network
642
643 - Severity 3 is a minor
644 incident or issue with low impact
645 to the
646 security, performance,
647 functionality or sustainability
648 of the
649 Cardano Blockchain network
650
651 Future Performance Requirements.
652 Planned development such as new
653 mechanisms for out of memory
654 storage may impact block
655 diffusion or other
656 times. When changing parameters,
657 it is necessary to consider these
658 future performance requirements
659 as well as the current operation
660 of the
661 Cardano Blockchain. Until
662 development is complete, the
663 requirements will

606 longer diffused within 5s, then a
607 change must be made to revert the
608 block size to 100KB. If this is
609 not possible, then one or more
610 alternative changes must be made
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651 it is necessary to consider these
652 future performance requirements
653 as well as the current operation
654 of the
655 Cardano Blockchain. Until
656 development is complete, the
657 requirements will

637 be conservative but may then be
relaxed to account for actual
timing
638 behavior.
639
640 ##### **Automated Checking
("Guardrails Script")**
641
642 A script hash is associated with
the Constitution hash when a New
643 Constitution or Guardrails Script
governance action is enacted. It
acts
644 as an additional safeguard to the
ledger rules and types, filtering
645 non-compliant governance actions.
646
647 The Guardrails Script only
affects two types of governance
actions:
648
649 - "Parameter Update" actions,
and
650
651 - "Treasury Withdrawals"
action.
652
653 The Guardrails Script is executed
when either of these types of
654 governance action is submitted
on-chain. This avoids scenarios
where,
655 for example, an erroneous script
could prevent the Cardano
Blockchain
656 from ever enacting a Hard Fork
action, resulting in deadlock.
There are
657 three different situations that
apply to Guardrail Script usage.
658
659 Symbol and Explanation
660
661 - (y) The Guardrail Script can
be used to enforce the Guardrail
662
663 - (x) The Guardrail Script
cannot be used to enforce the
Guardrail
664
665 - (~ - reason) The Guardrail
Script cannot be used to enforce

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Script cannot be used to enforce

the
666 Guardrail for the reason
given, but future ledger changes
could
667 enable this.
668
669 Guardrails may overlap: in this
case, the most restrictive set of
670 Guardrails will apply.
671
672 Where a parameter is not
explicitly listed in this
document, then the
673 Guardrail Script must not permit
any changes to the parameter.
674
675 Conversely, where a parameter is
explicitly listed in this
document but
676 no checkable Guardrails are
specified, the Guardrail Script
must not
677 impose any constraints on changes
to the parameter.
678
679 ### **2. Guardrails and
Guidelines on "Parameter Update"
actions**
680
681 Below are Guardrails and
guidelines for changing updatable
protocol
682 parameter settings via the
"Parameter Update" action such
that the
683 Cardano Blockchain is never in an
unrecoverable state as a result
of
684 such changes.
685
686 Note that, to avoid ambiguity,
this Appendix uses the parameter
name
687 that is used in "Parameter
Update" actions rather than any
other
688 convention.
689
690 ##### **GUARDRAILS**
691
692 PARAM-01 (y) Any protocol
parameter that is not explicitly

the
660 Guardrail for the reason
given, but future ledger changes
could
661 enable this.
662
663 Guardrails may overlap: in this
case, the most restrictive set of
664 Guardrails will apply.
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682 convention.
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684 ##### **GUARDRAILS**
685
686 PARAM-01 (y) Any protocol
parameter that is not explicitly

named in this
693 document must not be changed by a
"Parameter Update" action
694
695 PARAM-02a (y) Where a protocol
parameter is explicitly listed in
this
696 document but no checkable
Guardrails are specified, the
Guardrails
697 Script must not impose any
constraints on changes to the
parameter.
698 Checkable Guardrails are shown by
a (y)
699
700 ### **2.1. Critical Protocol
Parameters**
701
702 The below protocol parameters are
critical from a security point of
703 view.
704
705 ##### **Parameters that are
Critical to the Operation of the
Blockchain**
706
707 - *maximum block body size*
(*maxBlockBodySize*)
708
709 - *maximum transaction size*
(*maxTxSize*)
710
711 - *maximum block header size*
(*maxBlockHeaderSize*)
712
713 - *maximum size of a serialized
asset value* (*maxValueSize*)
714
715 - *maximum script
execution/memory units in a
single block*
716
(*maxBlockExecutionUnits[steps/me
mory]*)
717
718 - *minimum fee coefficient*
(*txFeePerByte*)
719
720 - *minimum fee constant*
(*txFeeFixed*)
721

named in this
687 document must not be changed by a
"Parameter Update" action
688
689 PARAM-02a (y) Where a protocol
parameter is explicitly listed in
this
690 document but no checkable
Guardrails are specified, the
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691 Script must not impose any
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692 Checkable Guardrails are shown by
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asset value* (*maxValueSize*)
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execution/memory units in a
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(*maxBlockExecutionUnits[steps/me
mory]*)
711
712 - *minimum fee coefficient*
(*txFeePerByte*)
713
714 - *minimum fee constant*
(*txFeeFixed*)
715

722 - *minimum fee per byte for
reference scripts*

723 (*minFeeRefScriptCoinsPerByte*)

724

725 - *minimum lovelace deposit per
byte of serialized UTxO*

726 (*utxoCostPerByte*)

727

728 - *governance action deposit*

729 (*govDeposit*)

730 ##### **GUARDRAILS**

731

732 PARAM-03a (y) A parameter that is
critical to the operation of the
733 blockchain requires an SPO vote
in addition to a DRep vote: SPOs
must say

734 "yes" with a collective support
of more than 50% of all active
block

735 production stake. This is
enforced by the Guardrails on the
stake pool

736 voting threshold.

737

738 PARAM-04a (x) At least 90 days
should normally pass between the
739 publication of an off-chain
proposal to change a parameter
that is

740 critical to the operation of the
blockchain and the submission of
the

741 corresponding on-chain governance
action. This Guardrail may be
relaxed

742 in the event of a Severity 1 or
Severity 2 network issue
following

743 careful technical discussion and
evaluation.

744

745 ##### **Parameters that are
Critical to the Governance
System**

746

747 - *delegation key lovelace
deposit* (*stakeAddressDeposit*)

748

716 - *minimum fee per byte for
reference scripts*

717 (*minFeeRefScriptCoinsPerByte*)

718

719 - *minimum lovelace deposit per
byte of serialized UTxO*

720 (*utxoCostPerByte*)

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739 ##### **Parameters that are
Critical to the Governance
System**

740

741 - *delegation key lovelace
deposit* (*stakeAddressDeposit*)

742

749 - *pool registration lovelace
deposit* (*stakePoolDeposit*)
750
751 - *minimum fixed rewards cut
for pools* (*minPoolCost*)
752
753 - *DRep deposit amount*
(*dRepDeposit*)
754
755 - *minimal Constitutional
Committee size*
(*committeeMinSize*)
756
757 - *maximum term length (in
epochs) for the Constitutional
Committee
758 members*
(*committeeMaxTermLength*)
759
760 ##### **GUARDRAILS**
761
762 PARAM-05a (y) DReps must vote
"yes" with a collective support
of more
763 than 50% of all active voting
stake. This is enforced by the
Guardrails
764 on the DRep voting thresholds.
765
766 PARAM-06a (x) At least 90 days
should normally pass between the
767 publication of an off-chain
proposal to change a parameter
that is
768 critical to the governance system
and the submission of the
769 corresponding on-chain governance
action. This Guardrail may be
relaxed
770 in the event of a Severity 1 or
Severity 2 network issue
following
771 careful technical discussion and
evaluation.
772
773 ### **2.2. Economic Parameters**
774
775 The overall goals when managing
economic parameters are to:
776
777 1. Enable long-term economic
sustainability for the Cardano

743 - *pool registration lovelace
deposit* (*stakePoolDeposit*)
744
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for pools* (*minPoolCost*)
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761 publication of an off-chain
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767 ### **2.2. Economic Parameters**
768
769 The overall goals when managing
economic parameters are to:
770
771 1. Enable long-term economic
sustainability for the Cardano

Blockchain;
778
779 2. Ensure that stake pools are
adequately rewarded for
maintaining the
780 Cardano Blockchain;
781
782 3. Ensure that Ada Holders are
adequately rewarded for using
stake in
783 constructive ways, including
when delegating ada for block
784 production; and
785
786 4. Balance economic incentives
for different Cardano Blockchain
787 ecosystem stakeholders,
including but not limited to
Stake Pool
788 Operators, Ada Holders, DeFi
users, infrastructure users,
789 developers (e.g. DApps) and
financial intermediaries (e.g.
790 exchanges)
791
792 ##### **Triggers for Change**
793
794 1. Significant changes in the
fiat value of ada resulting in
potential
795 problems with security,
performance, functionality, or
long-term
796 sustainability
797
798 2. Changes in transaction
volumes or types
799
800 3. Community requests or
suggestions
801
802 4. Emergency situations that
require changes to economic
parameters
803
804 ##### **Counter-indicators**
805
806 Changes to the economic
parameters should not be made in
isolation. They

Blockchain;
772
773 2. Ensure that stake pools are
adequately rewarded for
maintaining the
774 Cardano Blockchain;
775
776 3. Ensure that ada owners are
adequately rewarded for using
stake in
777 constructive ways, including
when delegating ada for block
778 production; and
779
780 4. Balance economic incentives
for different Cardano Blockchain
781 ecosystem stakeholders,
including but not limited to
Stake Pool
782 Operators, ada owners, DeFi
users, infrastructure users,
783 developers (e.g. DApps) and
financial intermediaries (e.g.
784 exchanges)
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800 Changes to the economic
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807 need to account for:
 808
 809 – External economic factors
 810
 811 – Network security concerns
 812
 813 ##### **Core Metrics**
 814
 815 – Fiat value of ada resulting
 in potential problems with
 security,
 816 performance, functionality,
 or long-term sustainability
 817
 818 – Transaction volumes and types
 819
 820 – Number and health of stake
 pools
 821
 822 – External economic factors
 823
 824 ##### **Changes to Specific
 Economic Parameters**
 825
 826 Transaction fee per byte
 (txFeePerByte) and fixed
 transaction fee
 827 (txFeeFixed)
 828
 829 Defines the cost for basic
 transactions in lovelace:
 830
 831 $\text{*fee(tx) = txFeeFixed + txFeePerByte} \times \text{nBytes(tx)*}$
 832
 833 ##### **GUARDRAILS**
 834
 835 TFPB-01 (y) *txFeePerByte* must
 not be lower than 30 (0.000030
 ada) This
 836 protects against low-cost denial
 of service attacks
 837
 838 TFPB-02 (y) *txFeePerByte* must
 not exceed 1,000 (0.001 ada) This
 839 ensures that transactions can be
 paid for
 840
 841 TFPB-03 (y) *txFeePerByte* must
 not be negative
 842

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 836

843 TFF-01 (y) *txFeeFixed* must not
 be lower than 100,000 (0.1 ada)
 This
 844 protects against low-cost denial
 of service attacks
 845
 846 TFF-02 (y) *txFeeFixed* must not
 exceed 10,000,000 (10 ada) This
 ensures
 847 that transactions can be paid for
 848
 849 TFF-03 (y) *txFeeFixed* must not
 be negative
 850
 851 TFGEN-01 (x - "should") To
 maintain a consistent level of
 protection
 852 against denial-of-service
 attacks, *txFeeFixed* and
 txFeePerByte
 853 should be adjusted whenever
 Plutus Execution prices are
 adjusted
 854 (executionUnitPrices[steps/memory
])
 855
 856 TFGEN-02 (x - "unquantifiable")
 Any changes to *txFeeFixed* or
 857 *txFeePerByte* must consider the
 implications of reducing the cost
 of a
 858 denial-of-service attack or
 increasing the maximum
 transaction fee so
 859 that it becomes impossible to
 construct a transaction.
 860
 861 ##### **UTx0 cost per byte
 (utxoCostPerByte)**
 862
 863 Defines the deposit (in lovelace)
 that is charged for each byte of
 864 storage that is held in a UTx0.
 This deposit is returned when the
 UTx0
 865 is no longer active.
 866
 867 - Sets a minimum threshold on
 ada that is held within a single
 UTx0
 868

837 TFF-01 (y) *txFeeFixed* must not
 be lower than 100,000 (0.1 ada)
 This
 838 protects against low-cost denial
 of service attacks
 839
 840 TFF-02 (y) *txFeeFixed* must not
 exceed 10,000,000 (10 ada) This
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 841 that transactions can be paid for
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 construct a transaction.
 854
 855 ##### **UTx0 cost per byte
 (utxoCostPerByte)**
 856
 857 Defines the deposit (in lovelace)
 that is charged for each byte of
 858 storage that is held in a UTx0.
 This deposit is returned when the
 UTx0
 859 is no longer active.
 860
 861 - Sets a minimum threshold on
 ada that is held within a single
 UTx0
 862

869 – Provides protection against
low-cost denial of service attack
on

870 UTx0 storage. DoS protection
decreases in line with the free
node

871 memory (proportional to UTx0
growth)

872

873 – Helps reduce long-term
storage costs for node users by
providing an

874 incentive to return UTx0s
when no longer needed, or to
merge

875 UTx0s.

876

877 ##### **GUARDRAILS**

878

879 UCPB-01 (y) *utxoCostPerByte*
must not be lower than 3,000
(0.003 ada)

880

881 UCPB-02 (y) *utxoCostPerByte*
must not exceed 6,500 (0.0065
ada)

882

883 UCPB-03 (y) *utxoCostPerByte*
must not be zero

884

885 UCPB-04 (y) *utxoCostPerByte*
must not be negative

886

887 UCPB-05a (x – "should") Changes
should account for

888

889 1. The acceptable cost of attack

890

891 2. The acceptable time for an
attack

892

893 3. The acceptable memory
configuration for full node users

894

895 4. The sizes of UTx0s and

896

897 5. The current total node memory
usage

898

899 ##### **Stake address deposit
(stakeAddressDeposit)**

900

863 – Provides protection against
low-cost denial of service attack
on

864 UTx0 storage. DoS protection
decreases in line with the free
node

865 memory (proportional to UTx0
growth)

866

867 – Helps reduce long-term
storage costs for node users by
providing an

868 incentive to return UTx0s
when no longer needed, or to
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attack

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887 3. The acceptable memory
configuration for full node users

888

889 4. The sizes of UTx0s and

890

891 5. The current total node memory
usage

892

893 ##### **Stake address deposit
(stakeAddressDeposit)**

894

901 Ensures that stake addresses are
 retired when no longer needed
 902
 903 – Helps reduce long-term
 storage costs
 904
 905 – Helps limit CPU and memory
 costs in the ledger
 906
 907 The rationale for the deposit is
 to incentivize that scarce memory
 908 resources are returned when they
 are no longer required. Reducing
 the
 909 number of active stake addresses
 also reduces processing and
 memory
 910 costs at the epoch boundary when
 calculating stake snapshots.
 911
 912 ##### **GUARDRAILS**
 913
 914 SAD-01 (y) *stakeAddressDeposit*
 must not be lower than 1,000,000
 (1
 915 ada)
 916
 917 SAD-02 (y) *stakeAddressDeposit*
 must not exceed 5,000,000 (5 ada)
 918
 919 SAD-03 (y) *stakeAddressDeposit*
 must not be negative
 920
 921 ##### **Stake pool deposit
 (stakePoolDeposit)**
 922
 923 Ensures that stake pools are
 retired by the stake pool
 operator when no
 924 longer needed by them
 925
 926 – Helps reduce long-term
 storage costs
 927
 928 The rationale for the deposit is
 to incentivize that scarce memory
 929 resources are returned when they
 are no longer required. Rewards
 and
 930 stake snapshot calculations are
 also impacted by the number of
 active

895 Ensures that stake addresses are
 retired when no longer needed
 896
 897 – Helps reduce long-term
 storage costs
 898
 899 – Helps limit CPU and memory
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 904 costs at the epoch boundary when
 calculating stake snapshots.
 905
 906 ##### **GUARDRAILS**
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 908 SAD-01 (y) *stakeAddressDeposit*
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 (1
 909 ada)
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 912
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 retired by the stake pool
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 storage costs
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 to incentivize that scarce memory
 923 resources are returned when they
 are no longer required. Rewards
 and
 924 stake snapshot calculations are
 also impacted by the number of
 active

931 stake pools.
932
933 ##### **GUARDRAILS**
934
935 SPD-01 (y) *stakePoolDeposit*
must not be lower than
250,000,000 (250
936 ada)
937
938 SPD-02 (y) *stakePoolDeposit*
must not exceed 500,000,000 (500
ada)
939
940 SPD-03 (y) *stakePoolDeposit*
must not be negative
941
942 ##### **Minimum Pool Cost
(minPoolCost)**
943
944 Part of the rewards mechanism
945
946 - The minimum pool cost is
transferred to the pool rewards
address
947 before any delegator rewards
are paid
948
949 ##### **GUARDRAILS**
950
951 MPC-01 (y) *minPoolCost* must not
be negative
952
953 MPC-02 (y) *minPoolCost* must not
exceed 500,000,000 (500 ada)
954
955 MPC-03 (x - "should")
minPoolCost should be set in
line with the
956 economic cost for operating a
pool
957
958 ##### **Treasury Cut
(treasuryCut)**
959
960 Part of the rewards mechanism
961
962 - The treasury cut portion of
the monetary expansion is
transferred to
963 the treasury before any pool
rewards are paid
964

925 stake pools.
926
927 ##### **GUARDRAILS**
928
929 SPD-01 (y) *stakePoolDeposit*
must not be lower than
250,000,000 (250
930 ada)
931
932 SPD-02 (y) *stakePoolDeposit*
must not exceed 500,000,000 (500
ada)
933
934 SPD-03 (y) *stakePoolDeposit*
must not be negative
935
936 ##### **Minimum Pool Cost
(minPoolCost)**
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minPoolCost should be set in
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950 economic cost for operating a
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951
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(treasuryCut)**
953
954 Part of the rewards mechanism
955
956 - The treasury cut portion of
the monetary expansion is
transferred to
957 the treasury before any pool
rewards are paid
958

965 - Can be set in the range 0.0-
1.0 (0%-100%)
966
967 ##### **GUARDRAILS**
968
969 TC-01 (y) *treasuryCut* must not
be lower than 0.1 (10%)
970
971 TC-02 (y) *treasuryCut* must not
exceed 0.3 (30%)
972
973 TC-03 (y) *treasuryCut* must not
be negative
974
975 TC-04 (y) *treasuryCut* must not
exceed 1.0 (100%)
976
977 TC-05 (~ - no access to change
history) *treasuryCut* must not
be
978 changed more than once in any 36
epoch period (approximately 6
months)
979
980 ##### **Monetary Expansion Rate
(monetaryExpansion)**
981
982 Part of the rewards mechanism
983
984 - The monetary expansion
controls the amount of reserves
that is used
985 for rewards each epoch
986
987 Governs the long-term
sustainability of the Cardano
Blockchain
988
989 - The reserves are gradually
depleted until no rewards are
supplied
990
991 ##### **GUARDRAILS**
992
993 ME-01 (y) *monetaryExpansion*
must not exceed 0.005
994
995 ME-02 (y) *monetaryExpansion*
must not be lower than 0.001
996
997 ME-03 (y) *monetaryExpansion*
must not be negative

959 - Can be set in the range 0.0-
1.0 (0%-100%)
960
961 ##### **GUARDRAILS**
962
963 TC-01 (y) *treasuryCut* must not
be lower than 0.1 (10%)
964
965 TC-02 (y) *treasuryCut* must not
exceed 0.3 (30%)
966
967 TC-03 (y) *treasuryCut* must not
be negative
968
969 TC-04 (y) *treasuryCut* must not
exceed 1.0 (100%)
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must not exceed 0.005
988
989 ME-02 (y) *monetaryExpansion*
must not be lower than 0.001
990
991 ME-03 (y) *monetaryExpansion*
must not be negative

998
999 ME-04 (x - "should")
 monetaryExpansion should not be
 varied by more
1000 than +/- 10% in any 73-epoch
 period (approximately 12 months)
1001
1002 ME-05 (x - "should")
 monetaryExpansion should not be
 changed more
1003 than once in any 36-epoch period
 (approximately 6 months)
1004
1005 ##### **Plutus Script Execution
 Prices
 (executionUnitPrices[priceSteps/p
 riceMemory])**
1006
1007 Define the fees for executing
 Plutus scripts
1008
1009 Gives an economic return for
 Plutus script execution
1010
1011 Provides security against low-
 cost DoS attacks
1012
1013 ##### **GUARDRAILS**
1014
1015 EIUP-PS-01 (y)
 executionUnitPrices[priceSteps]
 must not exceed 2,000
1016 / 10,000,000
1017
1018 EIUP-PS-02 (y)
 executionUnitPrices[priceSteps]
 must not be lower
1019 than 500 / 10,000,000
1020
1021 EIUP-PM-01 (y)
 *executionUnitPrices[priceMemory]
 * must not exceed
1022 2,000 / 10,000
1023
1024 EIUP-PM-02 (y)
 *executionUnitPrices[priceMemory]
 * must not be lower
1025 than 400 / 10,000
1026
1027 EIUP-GEN-01 (x - "similar to")
 The execution prices must be set
 so

992
993 ME-04 (x - "should")
 monetaryExpansion should not be
 varied by more
994 than +/- 10% in any 73-epoch
 period (approximately 12 months)
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997 than once in any 36-epoch period
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 Plutus script execution
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 cost DoS attacks
1006
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1008
1009 EIUP-PS-01 (y)
 executionUnitPrices[priceSteps]
 must not exceed 2,000
1010 / 10,000,000
1011
1012 EIUP-PS-02 (y)
 executionUnitPrices[priceSteps]
 must not be lower
1013 than 500 / 10,000,000
1014
1015 EIUP-PM-01 (y)
 *executionUnitPrices[priceMemory]
 * must not exceed
1016 2,000 / 10,000
1017
1018 EIUP-PM-02 (y)
 *executionUnitPrices[priceMemory]
 * must not be lower
1019 than 400 / 10,000
1020
1021 EIUP-GEN-01 (x - "similar to")
 The execution prices must be set
 so

1028 that
 1029
 1030 1. the cost of executing a
 transaction with maximum CPU
 steps is
 1031 similar to the cost of a
 maximum sized non-script
 transaction and
 1032
 1033 2. the cost of executing a
 transaction with maximum memory
 units is
 1034 similar to the cost of a
 maximum sized non-script
 transaction
 1035
 1036 EIUP-GEN-02 (x - "should") The
 execution prices should be
 adjusted
 1037 whenever transaction fees are
 adjusted
 (*txFeeFixed/txFeePerByte*). The
 1038 goal is to ensure that the
 processing delay is similar for
 "full"
 1039 transactions, regardless of their
 type.
 1040
 1041 - This helps ensure that the
 requirements on block
 1042 diffusion/propagation times
 are met.
 1043
 1044 ##### **Transaction fee per byte
 for a reference script
 (minFeeRefScriptCoinsPerByte)**
 1045
 1046 Defines the cost for using Plutus
 reference scripts in lovelace
 1047
 1048 ##### **GUARDRAILS**
 1049
 1050 MFRS-01 (y)
 minFeeRefScriptCoinsPerByte
 must not exceed 1,000 (0.001
 1051 ada)
 1052
 1053 - This ensures that
 transactions can be paid for
 1054
 1055 MFRS-02 (y)
 minFeeRefScriptCoinsPerByte

1022 that
 1023
 1024 1. the cost of executing a
 transaction with maximum CPU
 steps is
 1025 similar to the cost of a
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 transactions can be paid for
 1048
 1049 MFRS-02 (y)
 minFeeRefScriptCoinsPerByte

must not be negative

1056

1057 MFRS-03 (x – "should") To
maintain a consistent level of
protection

1058 against denial-of-service
attacks,
minFeeRefScriptCoinsPerByte
should

1059 be adjusted whenever Plutus
Execution prices are adjusted

1060 (*executionUnitPrices[steps/memor
y]*) and whenever *txFeeFixed* is
adjusted

1061

1062

1063 MFRS-04 (x – "unquantifiable")
Any changes to

1064 *minFeeRefScriptCoinsPerByte*
must consider the implications of
reducing

1065 the cost of a denial-of-service
attack or increasing the maximum
transaction fee

1066

1067

1068 ### **2.3. Network Parameters**

1069

1070 The overall goals when managing
the Cardano Blockchain network
parameters are to:

1071

1072

1073 1. Match the available Cardano
Blockchain Layer 1 network
capacity to

1074 current or future traffic
demands, including payment
transactions,

1075 layer 1 DApps, sidechain
management and governance needs

1076

1077 2. Balance traffic demands for
different user groups, including
payment

1078 transactions, minters of
Fungible/Non-Fungible Tokens,
Plutus

1079 scripts, DeFi developers,
Stake Pool Operators and voting
transactions

1080

1081

1082 ##### **Triggers for Change**

1083

must not be negative

1050

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maintain a consistent level of
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1052 against denial-of-service
attacks,
minFeeRefScriptCoinsPerByte
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Plutus

1073 scripts, DeFi developers,
Stake Pool Operators and voting
transactions

1074

1075

1076 ##### **Triggers for Change**

1077

1084 Changes to network parameters may
be triggered by:

1085

1086 1. Measured changes in traffic
demands over a 2-epoch period (10
days)

1087

1088 2. Anticipated changes in
traffic demands

1089

1090 3. Cardano Community requests

1091

1092 ##### **Counter-indicators**

1093

1094 Changes may need to be reversed
and/or should not be enacted in
the

1095 event of:

1096

1097 - Excessive block propagation
delays

1098

1099 - Stake pools being unable to
handle traffic volume

1100

1101 - Scripts being unable to
complete execution

1102

1103 ##### **Core Metrics**

1104

1105 All decisions on parameter
changes should be informed by:

1106

1107 - Block propagation delay
profile

1108

1109 - Traffic volume (block size
over time)

1110

1111 - Script volume (size of
scripts and execution units)

1112

1113 - Script execution cost
benchmarks

1114

1115 - Block propagation
delay/diffusion benchmarks

1116

1117 Detailed benchmarking results are
required to confirm the effect of
any

1078 Changes to network parameters may
be triggered by:

1079

1080 1. Measured changes in traffic
demands over a 2-epoch period (10
days)

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1082 2. Anticipated changes in
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1118 changes on mainnet performance or
behavior prior to enactment. The
1119 effects of different transaction
mixes must be analyzed, including
1120 normal transactions, Plutus
scripts, and governance actions.
1121
1122 ##### **GUARDRAILS**
1123
1124 NETWORK-01 (x - "should") No
individual network parameter
should
1125 change more than once per two
epochs
1126
1127 NETWORK-02 (x - "should") Only
one network parameter should be
changed
1128 per epoch unless they are
directly correlated, e.g., per-
transaction and
1129 per-block memory unit limits
1130
1131 ##### **Changes to Specific
Network Parameters**
1132
1133 ##### **Block Size
(maxBlockBodySize)**
1134
1135 The maximum size of a block, in
bytes.
1136
1137 ##### **GUARDRAILS**
1138
1139 MBBS-01 (y) *maxBlockBodySize*
must not exceed 122,880 bytes
(120KB)
1140
1141 MBBS-02 (y) *maxBlockBodySize*
must not be lower than 24,576
bytes
1142 (24KB)
1143
1144 MBBS-03a (x - exceptional
circumstances) *maxBlockBodySize*
must not
1145 be decreased, other than in
exceptional circumstances where
there are
1146 potential problems with security,
performance, functionality or
1147 long-term sustainability

1112 changes on mainnet performance or
behavior prior to enactment. The
1113 effects of different transaction
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1114 normal transactions, Plutus
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1139 be decreased, other than in
exceptional circumstances where
there are
1140 potential problems with security,
performance, functionality or
1141 long-term sustainability

1148
1149 MBBS-04 (~ – no access to
existing parameter values)
maxBlockBodySize
1150 must be large enough to include
at least one transaction (that
is,
1151 *maxBlockBodySize* must be at
least *maxTxSize*)
1152
1153 MBBS-05 (x – "should")
maxBlockBodySize should be
changed by at most
1154 10,240 bytes (10KB) per epoch (5
days), and preferably by 8,192
bytes
1155 (8KB) or less per epoch
1156
1157 MBBS-06 (x – "should") The block
size should not induce an
additional
1158 Transmission Control Protocol
(TCP) round trip. Any increase
beyond this
1159 must be backed by performance
analysis, simulation and
benchmarking
1160
1161 MBBS-07 (x – "unquantifiable")
The impact of any change to
1162 *maxBlockBodySize* must be
confirmed by detailed
benchmarking/simulation
1163 and not exceed the requirements
of the block
diffusion/propagation time
1164 budgets, as described below. Any
increase to *maxBlockBodySize*
must
1165 also consider future requirements
for Plutus script execution
1166 (*maxBlockExecutionUnits[steps]*)
against the total block diffusion
1167 target of 3s with 95% block
propagation within 5s. The limit
on maximum
1168 block size may be increased in
the future if this is supported
by
1169 benchmarking and monitoring
results
1170

1142
1143 MBBS-04 (~ – no access to
existing parameter values)
maxBlockBodySize
1144 must be large enough to include
at least one transaction (that
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1145 *maxBlockBodySize* must be at
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1161 target of 3s with 95% block
propagation within 5s. The limit
on maximum
1162 block size may be increased in
the future if this is supported
by
1163 benchmarking and monitoring
results
1164

1171 ##### **Transaction Size
(maxTxSize)**

1172

1173 The maximum size of a
transaction, in bytes.

1174

1175 ##### **GUARDRAILS**

1176

1177 MTS-01 (y) *maxTxSize* must not
exceed 32,768 bytes (32KB)

1178

1179 MTS-02 (y) *maxTxSize* must not
be negative

1180

1181 MTS-03 (~ – no access to existing
parameter values) *maxTxSize*
must

1182 not be decreased

1183

1184 MTS-04 (~ – no access to existing
parameter values) *maxTxSize*
must

1185 not exceed *maxBlockBodySize*

1186

1187 MTS-05 (x – "should") *maxTxSize*
should not be increased by more
than

1188 2,560 bytes (2.5KB) in any epoch,
and preferably should be
increased by

1189 2,048 bytes (2KB) or less per
epoch

1190

1191 MTS-06 (x – "should") *maxTxSize*
should not exceed 1/4 of the
block

1192 size

1193

1194 ##### **Memory Unit Limits
(maxBlockExecutionUnits[memory],
maxTxExecutionUnits[memory])**

1195

1196 The limit on the maximum number
of memory units that can be used
by

1197 Plutus scripts, either per-
transaction or per-block.

1198

1199 ##### **GUARDRAILS**

1200

1201 MTEU-M-01 (y)
maxTxExecutionUnits[memory]

1165 ##### **Transaction Size
(maxTxSize)**

1166

1167 The maximum size of a
transaction, in bytes.

1168

1169 ##### **GUARDRAILS**

1170

1171 MTS-01 (y) *maxTxSize* must not
exceed 32,768 bytes (32KB)

1172

1173 MTS-02 (y) *maxTxSize* must not
be negative

1174

1175 MTS-03 (~ – no access to existing
parameter values) *maxTxSize*
must

1176 not be decreased

1177

1178 MTS-04 (~ – no access to existing
parameter values) *maxTxSize*
must

1179 not exceed *maxBlockBodySize*

1180

1181 MTS-05 (x – "should") *maxTxSize*
should not be increased by more
than

1182 2,560 bytes (2.5KB) in any epoch,
and preferably should be
increased by

1183 2,048 bytes (2KB) or less per
epoch

1184

1185 MTS-06 (x – "should") *maxTxSize*
should not exceed 1/4 of the
block

1186 size

1187

1188 ##### **Memory Unit Limits
(maxBlockExecutionUnits[memory],
maxTxExecutionUnits[memory])**

1189

1190 The limit on the maximum number
of memory units that can be used
by

1191 Plutus scripts, either per-
transaction or per-block.

1192

1193 ##### **GUARDRAILS**

1194

1195 MTEU-M-01 (y)
maxTxExecutionUnits[memory]

must not exceed 40,000,000
1202 units
1203
1204 MTEU-M-02 (y)
 maxTxExecutionUnits[memory]
 must not be negative
1205
1206 MTEU-M-03 (~ – no access to
 existing parameter values)
1207 *maxTxExecutionUnits[memory]*
 must not be decreased
1208
1209 MTEU-M-04 (x – "should")
 maxTxExecutionUnits[memory]
 should not be
1210 increased by more than 2,500,000
 units in any epoch
1211
1212 MBEU-M-01 (y)
 maxBlockExecutionUnits[memory]
 must not exceed
1213 120,000,000 units
1214
1215 MBEU-M-02 (y)
 maxBlockExecutionUnits[memory]
 must not be negative
1216
1217 MBEU-M-03 (x – "should")
 maxBlockExecutionUnits[memory]
 should not
1218 be changed (increased or
 decreased) by more than
 10,000,000 units in ANY
1219 epoch
1220
1221 MBEU-M-04a (x – "unquantifiable")
 The impact of any change to
1222 *maxBlockExecutionUnits[memory]*
 must be confirmed by detailed
1223 benchmarking/simulation and not
 exceed the requirements of the
 block
1224 diffusion/propagation time
 budgets, as also impacted by
1225 *maxBlockExecutionUnits[steps]*
 and *maxBlockBodySize*. Any
 increase
1226 must also consider previously
 agreed future requirements for
 the total
1227 block size (*maxBlockBodySize*)
 measured against the total block

must not exceed 40,000,000
1196 units
1197
1198 MTEU-M-02 (y)
 maxTxExecutionUnits[memory]
 must not be negative
1199
1200 MTEU-M-03 (~ – no access to
 existing parameter values)
1201 *maxTxExecutionUnits[memory]*
 must not be decreased
1202
1203 MTEU-M-04 (x – "should")
 maxTxExecutionUnits[memory]
 should not be
1204 increased by more than 2,500,000
 units in any epoch
1205
1206 MBEU-M-01 (y)
 maxBlockExecutionUnits[memory]
 must not exceed
1207 120,000,000 units
1208
1209 MBEU-M-02 (y)
 maxBlockExecutionUnits[memory]
 must not be negative
1210
1211 MBEU-M-03 (x – "should")
 maxBlockExecutionUnits[memory]
 should not
1212 be changed (increased or
 decreased) by more than
 10,000,000 units in ANY
1213 epoch
1214
1215 MBEU-M-04a (x – "unquantifiable")
 The impact of any change to
1216 *maxBlockExecutionUnits[memory]*
 must be confirmed by detailed
1217 benchmarking/simulation and not
 exceed the requirements of the
 block
1218 diffusion/propagation time
 budgets, as also impacted by
1219 *maxBlockExecutionUnits[steps]*
 and *maxBlockBodySize*. Any
 increase
1220 must also consider previously
 agreed future requirements for
 the total
1221 block size (*maxBlockBodySize*)
 measured against the total block

1228 diffusion target of 3s with 95%
block propagation within 5s.
Future
1229 Plutus performance improvements
may allow the per-block memory
limit to
1230 be increased, but must be
balanced against the overall
diffusion limits
1231 as specified in the previous
sentence, and future requirements
1232
1233 MEU-M-01 (~ - no access to
existing parameter values)
1234 *maxBlockExecutionUnits[memory]*
must not be less than
1235 *maxTxExecutionUnits[memory]*
1236
1237 ##### **CPU Unit Limits
(maxBlockExecutionUnits[steps],
maxTxExecutionUnits[steps])**
1238
1239 The limit on the maximum number
of CPU steps that can be used by
Plutus
1240 scripts, either per transaction
or per-block.
1241
1242 ##### **GUARDRAILS**
1243
1244 MTEU-S-01 (y)
maxTxExecutionUnits[steps] must
not exceed
1245 15,000,000,000 (15Bn) units
1246
1247 MTEU-S-02 (y)
maxTxExecutionUnits[steps] must
not be negative
1248
1249 MTEU-S-03 (~ - no access to
existing parameter values)
1250 *maxTxExecutionUnits[steps]* must
not be decreased
1251
1252 MTEU-S-04 (x - "should")
maxTxExecutionUnits[steps]
should not be
1253 increased by more than
500,000,000 (500M) units in any
epoch (5 days)
1254

1222 diffusion target of 3s with 95%
block propagation within 5s.
Future
1223 Plutus performance improvements
may allow the per-block memory
limit to
1224 be increased, but must be
balanced against the overall
diffusion limits
1225 as specified in the previous
sentence, and future requirements
1226
1227 MEU-M-01 (~ - no access to
existing parameter values)
1228 *maxBlockExecutionUnits[memory]*
must not be less than
1229 *maxTxExecutionUnits[memory]*
1230
1231 ##### **CPU Unit Limits
(maxBlockExecutionUnits[steps],
maxTxExecutionUnits[steps])**
1232
1233 The limit on the maximum number
of CPU steps that can be used by
Plutus
1234 scripts, either per transaction
or per-block.
1235
1236 ##### **GUARDRAILS**
1237
1238 MTEU-S-01 (y)
maxTxExecutionUnits[steps] must
not exceed
1239 15,000,000,000 (15Bn) units
1240
1241 MTEU-S-02 (y)
maxTxExecutionUnits[steps] must
not be negative
1242
1243 MTEU-S-03 (~ - no access to
existing parameter values)
1244 *maxTxExecutionUnits[steps]* must
not be decreased
1245
1246 MTEU-S-04 (x - "should")
maxTxExecutionUnits[steps]
should not be
1247 increased by more than
500,000,000 (500M) units in any
epoch (5 days)
1248

1255 MBEU-S-01 (y)
maxBlockExecutionUnits[steps]
must not exceed
1256 40,000,000,000 (40Bn) units
1257
1258 MBEU-S-02 (y)
maxBlockExecutionUnits[steps]
must not be negative
1259
1260 MBEU-S-03 (x - "should")
maxBlockExecutionUnits[steps]
should not
1261 be changed (increased or
decreased) by more than
2,000,000,000 (2Bn)
1262 units in any epoch (5 days)
1263
1264 MBEU-S-04a (x - "unquantifiable")
The impact of the change to
1265 *maxBlockExecutionUnits[steps]*
must be confirmed by detailed
1266 benchmarking/simulation and not
exceed the requirements of the
block
1267 diffusion/propagation time
budgets, as also impacted by
1268 *maxBlockExecutionUnits[memory]*
and *maxBlockBodySize*. Any
increase
1269 must also consider previously
identified future requirements
for the
1270 total block size
(*maxBlockBodySize*) measured
against the total block
1271 diffusion target of 3s with 95%
block propagation within 5s.
Future
1272 Plutus performance improvements
may allow the per-block step
limit to be
1273 increased, but must be balanced
against the overall diffusion
limits as
1274 specified in the previous
sentence, and future requirements
1275
1276 MEU-S-01 (~ - no access to
existing parameter values)
1277 *maxBlockExecutionUnits[steps]*
must not be less than
1278 *maxTxExecutionUnits[steps]*

1249 MBEU-S-01 (y)
maxBlockExecutionUnits[steps]
must not exceed
1250 40,000,000,000 (40Bn) units
1251
1252 MBEU-S-02 (y)
maxBlockExecutionUnits[steps]
must not be negative
1253
1254 MBEU-S-03 (x - "should")
maxBlockExecutionUnits[steps]
should not
1255 be changed (increased or
decreased) by more than
2,000,000,000 (2Bn)
1256 units in any epoch (5 days)
1257
1258 MBEU-S-04a (x - "unquantifiable")
The impact of the change to
1259 *maxBlockExecutionUnits[steps]*
must be confirmed by detailed
1260 benchmarking/simulation and not
exceed the requirements of the
block
1261 diffusion/propagation time
budgets, as also impacted by
1262 *maxBlockExecutionUnits[memory]*
and *maxBlockBodySize*. Any
increase
1263 must also consider previously
identified future requirements
for the
1264 total block size
(*maxBlockBodySize*) measured
against the total block
1265 diffusion target of 3s with 95%
block propagation within 5s.
Future
1266 Plutus performance improvements
may allow the per-block step
limit to be
1267 increased, but must be balanced
against the overall diffusion
limits as
1268 specified in the previous
sentence, and future requirements
1269
1270 MEU-S-01 (~ - no access to
existing parameter values)
1271 *maxBlockExecutionUnits[steps]*
must not be less than
1272 *maxTxExecutionUnits[steps]*

1279
1280 ##### **Block Header Size
 (maxBlockHeaderSize)**
1281
1282 The size of the block header.
1283
1284 ##### **GUARDRAILS**
1285
1286 MBHS-01 (y) *maxBlockHeaderSize*
 must not exceed 5,000 bytes
1287
1288 MBHS-02 (y) *maxBlockHeaderSize*
 must not be negative
1289
1290 MBHS-03 (x – largest valid header
 is subject to change)
1291 *maxBlockHeaderSize* must be
 large enough for the largest
 valid header
1292
1293 MBHS-04 (x – "should")
 maxBlockHeaderSize should only
 normally be
1294 increased if the protocol changes
1295
1296 MBHS-05 (x – "should")
 maxBlockHeaderSize should be
 within TCP's
1297 initial congestion window (3 or
 10 MTUs)
1298
1299 ### **2.4. Technical/Security
 Parameters**
1300
1301 The overall goals when managing
 the technical/security parameters
 are:
1302
1303 1. Ensure the security of the
 Cardano Blockchain network in
 terms of
1304 decentralization and
 protection against adversarial
 actions
1305
1306 2. Enable changes to the Plutus
 language
1307
1308 ##### **Triggers for Change**
1309
1310 1. Changes in the number of
 active SP0s

1273
1274 ##### **Block Header Size
 (maxBlockHeaderSize)**
1275
1276 The size of the block header.
1277
1278 ##### **GUARDRAILS**
1279
1280 MBHS-01 (y) *maxBlockHeaderSize*
 must not exceed 5,000 bytes
1281
1282 MBHS-02 (y) *maxBlockHeaderSize*
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1283
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 normally be
1288 increased if the protocol changes
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1290 MBHS-05 (x – "should")
 maxBlockHeaderSize should be
 within TCP's
1291 initial congestion window (3 or
 10 MTUs)
1292
1293 ### **2.4. Technical/Security
 Parameters**
1294
1295 The overall goals when managing
 the technical/security parameters
 are:
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 Cardano Blockchain network in
 terms of
1298 decentralization and
 protection against adversarial
 actions
1299
1300 2. Enable changes to the Plutus
 language
1301
1302 ##### **Triggers for Change**
1303
1304 1. Changes in the number of
 active SP0s

1311
1312 2. Changes to the Plutus
language
1313
1314 3. Security threats
1315
1316 4. Cardano Community requests
1317
1318 ##### **Counter-indicators**
1319
1320 - Economic concerns, e.g. when
changing the number of stake
pools
1321
1322 ##### **Core Metrics**
1323
1324 - Number of stake pools
1325
1326 - Level of decentralization
1327
1328 ##### **Changes to Specific
Technical/Security Parameters**
1329
1330 ##### **Target Number of Stake
Pools (stakePoolTargetNum)**
1331
1332 Sets the target number of stake
pools
1333
1334 - The expected number of stake
pools when the network is in the
1335 equilibrium state
1336
1337 - Primarily a security
parameter, ensuring
decentralization by stake
1338 pool division/replication
1339
1340 - Has an economic effect as
well as a security effect -
economic
1341 advice based on analysis is
also required when changing this
1342 parameter
1343
1344 - Large changes in this
parameter will trigger mass
redelegation
1345 events
1346
1347 ##### **GUARDRAILS**
1348

1305
1306 2. Changes to the Plutus
language
1307
1308 3. Security threats
1309
1310 4. Cardano Community requests
1311
1312 ##### **Counter-indicators**
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1314 - Economic concerns, e.g. when
changing the number of stake
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well as a security effect -
economic
1335 advice based on analysis is
also required when changing this
1336 parameter
1337
1338 - Large changes in this
parameter will trigger mass
redelegation
1339 events
1340
1341 ##### **GUARDRAILS**
1342

1349 SPTN-01 (y) *stakePoolTargetNum*
must not be lower than 250
1350
1351 SPTN-02 (y) *stakePoolTargetNum*
must not exceed 2,000
1352
1353 SPTN-03 (y) *stakePoolTargetNum*
must not be negative
1354
1355 SPTN-04 (y) *stakePoolTargetNum*
must not be zero
1356
1357 ##### **Pledge Influence Factor
(poolPledgeInfluence)**
1358
1359 Enables the pledge protection
mechanism
1360
1361 Provides protection against Sybil
attack
1362
1363 – Higher values reward pools
that have more pledge and
penalize pools
1364 that have less pledge
1365
1366 Has an economic effect as well as
technical effect – economic
advice
1367 based on analysis is also
required
1368
1369 ##### **GUARDRAILS**
1370
1371 PPI-01 (y) *poolPledgeInfluence*
must not be lower than 0.1
1372
1373 PPI-02 (y) *poolPledgeInfluence*
must not exceed 1.0
1374
1375 PPI-03 (y) *poolPledgeInfluence*
must not be negative
1376
1377 PPI-04 (x – "should")
poolPledgeInfluence should not
vary by more
1378 than +/- 10% in any 18-epoch
period (approximately 3 months)
1379
1380 ##### **Pool Retirement Window
(poolRetireMaxEpoch)**
1381

1343 SPTN-01 (y) *stakePoolTargetNum*
must not be lower than 250
1344
1345 SPTN-02 (y) *stakePoolTargetNum*
must not exceed 2,000
1346
1347 SPTN-03 (y) *stakePoolTargetNum*
must not be negative
1348
1349 SPTN-04 (y) *stakePoolTargetNum*
must not be zero
1350
1351 ##### **Pledge Influence Factor
(poolPledgeInfluence)**
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1353 Enables the pledge protection
mechanism
1354
1355 Provides protection against Sybil
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1357 – Higher values reward pools
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penalize pools
1358 that have less pledge
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1360 Has an economic effect as well as
technical effect – economic
advice
1361 based on analysis is also
required
1362
1363 ##### **GUARDRAILS**
1364
1365 PPI-01 (y) *poolPledgeInfluence*
must not be lower than 0.1
1366
1367 PPI-02 (y) *poolPledgeInfluence*
must not exceed 1.0
1368
1369 PPI-03 (y) *poolPledgeInfluence*
must not be negative
1370
1371 PPI-04 (x – "should")
poolPledgeInfluence should not
vary by more
1372 than +/- 10% in any 18-epoch
period (approximately 3 months)
1373
1374 ##### **Pool Retirement Window
(poolRetireMaxEpoch)**
1375

1382 Defines the maximum number of
epochs notice that a pool can
give when
1383 planning to retire
1384
1385 ##### **GUARDRAILS**
1386
1387 PRME-01 (y) *poolRetireMaxEpoch*
must not be negative
1388
1389 PRME-02 (x - "should")
poolRetireMaxEpoch should not
be lower than 1
1390
1391 ##### **Collateral Percentage
(collateralPercentage)**
1392
1393 Defines how much collateral must
be provided when executing a
Plutus
1394 script as a percentage of the
normal execution cost
1395
1396 - Collateral is additional to
fee payments
1397
1398 - If a script fails to execute,
then the collateral is lost
1399
1400 - The collateral is never lost
if a script executes successfully
1401
1402 Provides security against low-
cost attacks by making it more
expensive
1403 rather than less expensive to
execute failed scripts
1404
1405 ##### **GUARDRAILS**
1406
1407 CP-01 (y) *collateralPercentage*
must not be lower than 100
1408
1409 CP-02 (y) *collateralPercentage*
must not exceed 200
1410
1411 CP-03 (y) *collateralPercentage*
must not be negative
1412
1413 CP-04 (y) *collateralPercentage*
must not be zero
1414

1376 Defines the maximum number of
epochs notice that a pool can
give when
1377 planning to retire
1378
1379 ##### **GUARDRAILS**
1380
1381 PRME-01 (y) *poolRetireMaxEpoch*
must not be negative
1382
1383 PRME-02 (x - "should")
poolRetireMaxEpoch should not
be lower than 1
1384
1385 ##### **Collateral Percentage
(collateralPercentage)**
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1395
1396 Provides security against low-
cost attacks by making it more
expensive
1397 rather than less expensive to
execute failed scripts
1398
1399 ##### **GUARDRAILS**
1400
1401 CP-01 (y) *collateralPercentage*
must not be lower than 100
1402
1403 CP-02 (y) *collateralPercentage*
must not exceed 200
1404
1405 CP-03 (y) *collateralPercentage*
must not be negative
1406
1407 CP-04 (y) *collateralPercentage*
must not be zero
1408

1415 ##### **Maximum number of
collateral inputs
(maxCollateralInputs)**
1416
1417 Defines the maximum number of
inputs that can be used for
collateral
1418 when executing a Plutus script
1419
1420 ##### **GUARDRAILS**
1421
1422 MCI-01 (y) *maxCollateralInputs*
must not be lower than 1
1423
1424 ##### **Maximum Value Size
(maxValueSize)**
1425
1426 The limit on the serialized size
of the Value in each output.
1427
1428 ##### **GUARDRAILS**
1429
1430 MVS-01 (y) *maxValueSize* must
not exceed 12,288 bytes (12KB)
1431
1432 MVS-02 (y) *maxValueSize* must
not be negative
1433
1434 MVS-03 (~ – no access to existing
parameter values) *maxValueSize*
must
1435 be less than *maxTxSize*
1436
1437 MVS-04 (~ – no access to existing
parameter values) *maxValueSize*
must
1438 not be reduced
1439
1440 MVS-05 (x – sensible output is
subject to interpretation)
1441 *maxValueSize* must be large
enough to allow sensible outputs
(e.g. any
1442 existing on-chain output or
anticipated outputs that could be
produced
1443 by new ledger rules)
1444
1445 ##### **Plutus Cost Models
(costModels)**
1446

1409 ##### **Maximum number of
collateral inputs
(maxCollateralInputs)**
1410
1411 Defines the maximum number of
inputs that can be used for
collateral
1412 when executing a Plutus script
1413
1414 ##### **GUARDRAILS**
1415
1416 MCI-01 (y) *maxCollateralInputs*
must not be lower than 1
1417
1418 ##### **Maximum Value Size
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1419
1420 The limit on the serialized size
of the Value in each output.
1421
1422 ##### **GUARDRAILS**
1423
1424 MVS-01 (y) *maxValueSize* must
not exceed 12,288 bytes (12KB)
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1428 MVS-03 (~ – no access to existing
parameter values) *maxValueSize*
must
1429 be less than *maxTxSize*
1430
1431 MVS-04 (~ – no access to existing
parameter values) *maxValueSize*
must
1432 not be reduced
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1434 MVS-05 (x – sensible output is
subject to interpretation)
1435 *maxValueSize* must be large
enough to allow sensible outputs
(e.g. any
1436 existing on-chain output or
anticipated outputs that could be
produced
1437 by new ledger rules)
1438
1439 ##### **Plutus Cost Models
(costModels)**
1440

1447 Define the base costs for each
Plutus primitive in terms of CPU
and
1448 memory units
1449
1450 A different cost model is
required for each Plutus version.
Each cost
1451 model comprises many distinct
cost model values. Cost models
are defined
1452 for each Plutus language version.
A new language version may
introduce
1453 additional cost model values or
remove existing cost model
values.
1454
1455 ##### **GUARDRAILS**
1456
1457 PCM-01 (x - "unquantifiable")
Cost model values must be set
by
1458 benchmarking on a reference
architecture
1459
1460 PCM-02 (x - primitives and
language versions aren't
introduced in
1461 transactions) The *cost model*
must be updated if new primitives
are
1462 introduced or a new Plutus
language version is added
1463
1464 PCM-03a (~ - no access to *Plutus
cost model* parameters) *Cost
model*
1465 values should not normally be
negative. Negative values must be
1466 justified against the underlying
cost model for the associated
1467 primitives
1468
1469 PCM-04 (~ - no access to *Plutus
cost model* parameters) A *cost
model*
1470 must be supplied for each Plutus
language version that the
protocol
1471 supports
1472

1441 Define the base costs for each
Plutus primitive in terms of CPU
and
1442 memory units
1443
1444 A different cost model is
required for each Plutus version.
Each cost
1445 model comprises many distinct
cost model values. Cost models
are defined
1446 for each Plutus language version.
A new language version may
introduce
1447 additional cost model values or
remove existing cost model
values.
1448
1449 ##### **GUARDRAILS**
1450
1451 PCM-01 (x - "unquantifiable")
Cost model values must be set
by
1452 benchmarking on a reference
architecture
1453
1454 PCM-02 (x - primitives and
language versions aren't
introduced in
1455 transactions) The *cost model*
must be updated if new primitives
are
1456 introduced or a new Plutus
language version is added
1457
1458 PCM-03a (~ - no access to *Plutus
cost model* parameters) *Cost
model*
1459 values should not normally be
negative. Negative values must be
1460 justified against the underlying
cost model for the associated
1461 primitives
1462
1463 PCM-04 (~ - no access to *Plutus
cost model* parameters) A *cost
model*
1464 must be supplied for each Plutus
language version that the
protocol
1465 supports
1466

1473 ### **2.5. Governance
Parameters**
1474
1475 The overall goals when managing
the governance parameters are to:
1476
1477 1. Ensure governance stability
1478
1479 2. Maintain a representative
form of governance
1480
1481 #### **Triggers for Change**
1482
1483 Changes to governance parameters
may be triggered by:
1484
1485 1. Cardano Community requests
1486
1487 2. Regulatory requirements
1488
1489 3. Unexpected or unwanted
governance outcomes
1490
1491 4. Entering a state of no
confidence
1492
1493 #### **Counter-indicators**
1494
1495 Changes may need to be reversed
and/or should not be enacted in
the
1496 event of:
1497
1498 – Unexpected effects on
governance
1499
1500 – Excessive Layer 1 load due to
on-chain voting or excessive
numbers
1501 of governance actions
1502
1503 #### **Core Metrics**
1504
1505 All decisions on parameter
changes should be informed by:
1506
1507 – Governance participation
levels
1508
1509 – Governance behaviors and
patterns
1510

1467 ### **2.5. Governance
Parameters**
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1469 The overall goals when managing
the governance parameters are to:
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and/or should not be enacted in
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1495 of governance actions
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1501 – Governance participation
levels
1502
1503 – Governance behaviors and
patterns
1504

1511 – Regulatory considerations
 1512
 1513 – Confidence in the governance
 system
 1514
 1515 – The effectiveness of the
 governance system in managing
 necessary
 1516 change
 1517
 1518 ##### **Changes to Specific
 Governance Parameters**
 1519
 1520 ##### **Deposit for Governance
 Actions (govDeposit)**
 1521
 1522 The deposit that is charged when
 submitting a governance action.
 1523
 1524 – Helps to limit the number of
 actions that are submitted
 1525
 1526 ##### **GUARDRAILS**
 1527
 1528 GD-01 (y) *govDeposit* must not
 be negative
 1529
 1530 GD-02 (y) *govDeposit* must not
 be lower than 1,000,000 (1 ada)
 1531
 1532 GD-03a (y) *govDeposit* must not
 exceed 10,000,000,000,000 (10
 1533 million
 1534 ada)
 1535 GD-04 (x – "should") *govDeposit*
 should be adjusted in line with
 fiat
 1536 changes
 1537
 1538 ##### **Deposit for DReps
 (dRepDeposit)**
 1539
 1540 The deposit that is charged when
 registering a DRep.
 1541
 1542 – Helps to limit the number of
 active DReps
 1543
 1544 ##### **GUARDRAILS**
 1545

1505 – Regulatory considerations
 1506
 1507 – Confidence in the governance
 system
 1508
 1509 – The effectiveness of the
 governance system in managing
 necessary
 1510 change
 1511
 1512 ##### **Changes to Specific
 Governance Parameters**
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 1526 GD-03a (y) *govDeposit* must not
 exceed 10,000,000,000,000 (10
 1527 million
 1528 ada)
 1529 GD-04 (x – "should") *govDeposit*
 should be adjusted in line with
 fiat
 1530 changes
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 (dRepDeposit)**
 1533
 1534 The deposit that is charged when
 registering a DRep.
 1535
 1536 – Helps to limit the number of
 active DReps
 1537
 1538 ##### **GUARDRAILS**
 1539

1546 DRD-01 (y) *dRepDeposit* must not
be negative

1547

1548 DRD-02 (y) *dRepDeposit* must not
be lower than 1,000,000 (1 ada)

1549

1550 DRD-03 (y) *dRepDeposit* must not
exceed 100,000,000,000 (100,000
ada)

1551

1552 DRD-04 (x - "should")
dRepDeposit should be adjusted
in line with

1553 fiat changes

1554

1555 ##### **DRep Activity Period
(dRepActivity)**

1556

1557 The period (as a whole number of
epochs) after which a DRep is

1558 considered to be inactive for
vote calculation purposes, if
they do not

1559 vote on any proposal.

1560

1561 ##### **GUARDRAILS**

1562

1563 DRA-01 (y) *dRepActivity* must
not be lower than 13 epochs (65
days)

1564

1565 DRA-02 (y) *dRepActivity* must
not exceed 37 epochs (185 days)

1566

1567 DRA-03 (y) *dRepActivity* must
not be negative

1568

1569 DRA-04 (~ - no access to existing
parameter values) *dRepActivity*
must

1570 be greater than
govActionLifetime

1571

1572 DRA-05 (x - "should")
dRepActivity should be
calculated in human

1573 terms (60 days, etc.)

1574

1575 ##### **DRep and SPO Governance
Action Thresholds
(dRepVotingThresholds[...],poolVo
tingThresholds[...])**

1540 DRD-01 (y) *dRepDeposit* must not
be negative

1541

1542 DRD-02 (y) *dRepDeposit* must not
be lower than 1,000,000 (1 ada)

1543

1544 DRD-03 (y) *dRepDeposit* must not
exceed 100,000,000,000 (100,000
ada)

1545

1546 DRD-04 (x - "should")
dRepDeposit should be adjusted
in line with

1547 fiat changes

1548

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(dRepActivity)**

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epochs) after which a DRep is

1552 considered to be inactive for
vote calculation purposes, if
they do not

1553 vote on any proposal.

1554

1555 ##### **GUARDRAILS**

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not be lower than 13 epochs (65
days)

1558

1559 DRA-02 (y) *dRepActivity* must
not exceed 37 epochs (185 days)

1560

1561 DRA-03 (y) *dRepActivity* must
not be negative

1562

1563 DRA-04 (~ - no access to existing
parameter values) *dRepActivity*
must

1564 be greater than
govActionLifetime

1565

1566 DRA-05 (x - "should")
dRepActivity should be
calculated in human

1567 terms (60 days, etc.)

1568

1569 ##### **DRep and SPO Governance
Action Thresholds
(dRepVotingThresholds[...],poolVo
tingThresholds[...])**

1576
1577 Thresholds on the active voting
stake that is required to ratify
a
1578 specific type of governance
action by either DReps or SP0s.
1579
1580 - Ensures legitimacy of the
action
1581
1582 The threshold parameters are
listed below:
1583
1584 *dRepVotingThresholds*:
1585
1586 - *dvtCommitteeNoConfidence*
1587
1588 - *dvtCommitteeNormal*
1589
1590 - *dvtHardForkInitiation*
1591
1592 - *dvtMotionNoConfidence*
1593
1594 - *dvtPPEconomicGroup*
1595
1596 - *dvtPPGovGroup*
1597
1598 - *dvtPPNetworkGroup*
1599
1600 - *dvtPPTechnicalGroup*
1601
1602 - *dvtTreasuryWithdrawal*
1603
1604 - *dvtUpdateToConstitution*
1605
1606 *poolVotingThresholds*:
1607
1608 - *pvtCommitteeNoConfidence*
1609
1610 - *pvtCommitteeNormal*
1611
1612 - *pvtHardForkInitiation*
1613
1614 - *pvtMotionNoConfidence*
1615
1616 - *pvtPPSecurityGroup*
1617
1618 ##### **GUARDRAILS**
1619
1620 VT-GEN-01 (y) All thresholds must
be greater than 50% and less than
or

1570
1571 Thresholds on the active voting
stake that is required to ratify
a
1572 specific type of governance
action by either DReps or SP0s.
1573
1574 - Ensures legitimacy of the
action
1575
1576 The threshold parameters are
listed below:
1577
1578 *dRepVotingThresholds*:
1579
1580 - *dvtCommitteeNoConfidence*
1581
1582 - *dvtCommitteeNormal*
1583
1584 - *dvtHardForkInitiation*
1585
1586 - *dvtMotionNoConfidence*
1587
1588 - *dvtPPEconomicGroup*
1589
1590 - *dvtPPGovGroup*
1591
1592 - *dvtPPNetworkGroup*
1593
1594 - *dvtPPTechnicalGroup*
1595
1596 - *dvtTreasuryWithdrawal*
1597
1598 - *dvtUpdateToConstitution*
1599
1600 *poolVotingThresholds*:
1601
1602 - *pvtCommitteeNoConfidence*
1603
1604 - *pvtCommitteeNormal*
1605
1606 - *pvtHardForkInitiation*
1607
1608 - *pvtMotionNoConfidence*
1609
1610 - *pvtPPSecurityGroup*
1611
1612 ##### **GUARDRAILS**
1613
1614 VT-GEN-01 (y) All thresholds must
be greater than 50% and less than
or

1621 equal to 100%
 1622
 1623 VT-GEN-02a (y) Economic, network
 and technical/security parameter
 1624 thresholds must be in the range
 51%–75%
 1625
 1626 VT-GEN-03 (y) Governance
 parameter thresholds must be in
 the range
 1627 75%–90%
 1628
 1629 VT-HF-01 (y) "Hard Fork
 Initiation" action thresholds
 must be in the
 1630 range 51%–80%
 1631
 1632 VT-CON-01 (y) "New Constitution"
 action thresholds must be in the
 range
 1633 65%–90%
 1634
 1635 VT-CC-01 (y) "Update Committee"
 action thresholds must be in the
 range
 1636 51%–90%
 1637
 1638 VT-NC-01 (y) "No Confidence"
 action thresholds must be in the
 range
 1639 51%–75%
 1640
 1641 ##### **Governance Action Lifetime
 (govActionLifetime)**
 1642
 1643 The period after which a
 governance action will expire if
 it is not
 1644 enacted – as a whole number of
 epochs
 1645
 1646 ##### **GUARDRAILS**
 1647
 1648 GAL-01 (y) *govActionLifetime*
 must not be lower than 1 epoch (5
 days)
 1649
 1650 GAL-03 (x – "should")
 govActionLifetime should not be
 lower than 2
 1651 epochs (10 days)
 1652

1615 equal to 100%
 1616
 1617 VT-GEN-02a (y) Economic, network
 and technical/security parameter
 1618 thresholds must be in the range
 51%–75%
 1619
 1620 VT-GEN-03 (y) Governance
 parameter thresholds must be in
 the range
 1621 75%–90%
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 1623 VT-HF-01 (y) "Hard Fork
 Initiation" action thresholds
 must be in the
 1624 range 51%–80%
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 range
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 action thresholds must be in the
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 action thresholds must be in the
 range
 1633 51%–75%
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 1635 ##### **Governance Action Lifetime
 (govActionLifetime)**
 1636
 1637 The period after which a
 governance action will expire if
 it is not
 1638 enacted – as a whole number of
 epochs
 1639
 1640 ##### **GUARDRAILS**
 1641
 1642 GAL-01 (y) *govActionLifetime*
 must not be lower than 1 epoch (5
 days)
 1643
 1644 GAL-03 (x – "should")
 govActionLifetime should not be
 lower than 2
 1645 epochs (10 days)
 1646

1653 GAL-02 (y) *govActionLifetime*
must not exceed 15 epochs (75
days)
1654
1655 GAL-04 (x - "should")
govActionLifetime should be
calibrated in
1656 human terms (e.g., 30 days, two
weeks), to allow sufficient time
for voting
1657 etc. to take place
1658
1659 GAL-05 (~ - no access to existing
parameter values)
govActionLifetime
1660 must be less than *dRepActivity*
1661
1662 ##### **Maximum Constitutional
Committee Term
(committeeMaxTermLength)**
1663
1664 The limit on the maximum term
length that a committee member
may serve
1665
1666 ##### **GUARDRAILS**
1667
1668 CMTL-01a (y)
committeeMaxTermLength must not
be zero
1669
1670 CMTL-02a (y)
committeeMaxTermLength must not
be negative
1671
1672 CMTL-03a (y)
committeeMaxTermLength must not
be lower than 18 epochs
1673 (90 days, or approximately 3
months)
1674
1675 CMTL-04a (y)
committeeMaxTermLength must not
exceed 293 epochs
1676 (approximately 4 years)
1677
1678 CMTL-05a (x - "should")
committeeMaxTermLength should
not exceed 220
1679 epochs (approximately 3 years)
1680

1647 GAL-02 (y) *govActionLifetime*
must not exceed 15 epochs (75
days)
1648
1649 GAL-04 (x - "should")
govActionLifetime should be
calibrated in
1650 human terms (e.g., 30 days, two
weeks), to allow sufficient time
for voting
1651 etc. to take place
1652
1653 GAL-05 (~ - no access to existing
parameter values)
govActionLifetime
1654 must be less than *dRepActivity*
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1656 ##### **Maximum Constitutional
Committee Term
(committeeMaxTermLength)**
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1658 The limit on the maximum term
length that a committee member
may serve
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1660 ##### **GUARDRAILS**
1661
1662 CMTL-01a (y)
committeeMaxTermLength must not
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1664 CMTL-02a (y)
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1667 (90 days, or approximately 3
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1668
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exceed 293 epochs
1670 (approximately 4 years)
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1672 CMTL-05a (x - "should")
committeeMaxTermLength should
not exceed 220
1673 epochs (approximately 3 years)
1674

1681 ##### **The minimum size of the
Constitutional Committee
(committeeMinSize)**

1682

1683 The least number of members that
can be included in a
Constitutional

1684 Committee following a governance
action to change the
Constitutional

1685 Committee.

1686

1687 ##### **GUARDRAILS**

1688

1689 CMS-01 (y) *committeeMinSize*
must not be negative

1690

1691 CMS-02 (y) *committeeMinSize*
must not be lower than 3

1692

1693 CMS-03 (y) *committeeMinSize*
must not exceed 10

1694

1695 ### **2.6. Monitoring and
Reversion of Parameter Changes**

1696

1697 All network parameter changes
must be monitored carefully for
no less

1698 than 2 epochs (10 days)

1699

1700 – Changes must be reverted as
soon as possible if block
propagation

1701 delays exceed 4.5s for more
than 5% of blocks over any 6 hour

1702 rolling window

1703

1704 All other parameter changes
should be monitored

1705

1706 – The reversion plan should be
implemented if the overall effect
on

1707 performance, security,
functionality, or long-term
sustainability

1708 is unacceptable.

1709

1710 A specific reversion/recovery
plan must be produced for each
parameter

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1683 CMS-01 (y) *committeeMinSize*
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1704 A specific reversion/recovery
plan must be produced for each
parameter

1711 change. This plan must include:
1712
1713 - Which parameters need to
change and in which ways in order
to return
1714 to the previous state (or a
similar state)
1715
1716 - How to recover the network in
the event of disastrous failure
1717
1718 This plan should be followed if
problems are observed following
the
1719 parameter change. Note that not
all changes can be reverted.
Additional
1720 care must be taken when making
changes to these parameters.
1721
1722 **### **2.7. Non-Updatable Protocol
Parameters****
1723
1724 Some fundamental protocol
parameters cannot be changed by
the
1725 "Parameter Update" action. These
parameters can only be changed in
a
1726 new Genesis file as part of a
hard fork. It is not necessary to
provide
1727 specific guardrails on updating
these parameters.
1728
1729 **### **3. Guardrails and
Guidelines on "Treasury
Withdrawals" Actions****
1730
1731 "Treasury Withdrawals" actions
specify the destination and
amount of a
1732 number of withdrawals from the
Cardano Treasury.
1733
1734 **##### **GUARDRAILS****
1735
1736 TREASURY-01a (x) A Net Change
Limit for the Cardano Treasury's
balance
1737 per period of time must be agreed
by the DReps via an on-chain

1705 change. This plan must include:
1706
1707 - Which parameters need to
change and in which ways in order
to return
1708 to the previous state (or a
similar state)
1709
1710 - How to recover the network in
the event of disastrous failure
1711
1712 This plan should be followed if
problems are observed following
the
1713 parameter change. Note that not
all changes can be reverted.
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1714 care must be taken when making
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1718 Some fundamental protocol
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1719 "Parameter Update" action. These
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1726 number of withdrawals from the
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1730 TREASURY-01a (x) A Net Change
Limit for the Cardano Treasury's
balance
1731 per period of time must be agreed
by the DReps via an on-chain

1738 governance action with a
threshold of greater than 50% of
the active
1739 voting stake
1740
1741 TREASURY-02a (x) Withdrawals from
the Cardano Blockchain treasury
must
1742 not exceed the Net Change Limit
for the Cardano Treasury's
balance per
1743 period of time
1744
1745 TREASURY-03a (x) Withdrawals from
the Cardano Blockchain treasury
must
1746 be denominated in ada
1747
1748 ### **4. Guardrails and
Guidelines on "Hard Fork
Initiation" actions**
1749
1750 The "Hard Fork Initiation" action
requires both a new major and a
new
1751 minor protocol version to be
specified.
1752
1753 – As positive integers
1754
1755 As the result of a hard fork, new
updatable protocol parameters may
be
1756 introduced. Guardrails may be
defined for these parameters,
which will
1757 take effect following the hard
fork. Existing updatable protocol
1758 parameters may also be deprecated
by the hard fork, in which case
the
1759 guardrails become obsolete for
all future changes.
1760
1761 ##### **GUARDRAILS**
1762
1763 HARDFORK-01 (~ – no access to
existing parameter values) The
major
1764 protocol version must be the same
as or one greater than the major

1732 governance action with a
threshold of greater than 50% of
the active
1733 voting stake
1734
1735 TREASURY-02a (x) Withdrawals from
the Cardano Blockchain treasury
must
1736 not exceed the Net Change Limit
for the Cardano Treasury's
balance per
1737 period of time
1738
1739 TREASURY-03a (x) Withdrawals from
the Cardano Blockchain treasury
must
1740 be denominated in ada
1741
1742 ### **4. Guardrails and
Guidelines on "Hard Fork
Initiation" actions**
1743
1744 The "Hard Fork Initiation" action
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1745 minor protocol version to be
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1746
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1750 introduced. Guardrails may be
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1751 take effect following the hard
fork. Existing updatable protocol
1752 parameters may also be deprecated
by the hard fork, in which case
the
1753 guardrails become obsolete for
all future changes.
1754
1755 ##### **GUARDRAILS**
1756
1757 HARDFORK-01 (~ – no access to
existing parameter values) The
major
1758 protocol version must be the same
as or one greater than the major

1765 version that will be enacted
immediately prior to this change.
If the
1766 major protocol version is one
greater, then the minor protocol
version
1767 must be zero
1768
1769 HARDFORK-02a (~ – no access to
existing parameter values) Unless
the
1770 major protocol version is also
changed, the minor protocol
version must
1771 be greater than the minor version
that will be enacted immediately
prior
1772 to this change
1773
1774 HARDFORK-03 (~ – no access to
existing parameter values) At
least one
1775 of the protocol versions (major
or minor or both) must change
1776
1777 HARDFORK-04a (x) At least 85% of
stake pools by active stake
should have
1778 upgraded to a Cardano Blockchain
node version that is capable of
1779 processing the rules associated
with the new protocol version
1780
1781 HARDFORK-05 (x) Any new updatable
protocol parameters that are
1782 introduced with a hard fork must
be included in this Appendix and
1783 suitable guardrails defined for
those parameters
1784
1785 HARDFORK-06 (x) Settings for any
new protocol parameters that are
1786 introduced with a hard fork must
be included in the appropriate
Genesis
1787 file
1788
1789 HARDFORK-07 (x) Any deprecated
protocol parameters must be
indicated in
1790 this Appendix
1791

1759 version that will be enacted
immediately prior to this change.
If the
1760 major protocol version is one
greater, then the minor protocol
version
1761 must be zero
1762
1763 HARDFORK-02a (~ – no access to
existing parameter values) Unless
the
1764 major protocol version is also
changed, the minor protocol
version must
1765 be greater than the minor version
that will be enacted immediately
prior
1766 to this change
1767
1768 HARDFORK-03 (~ – no access to
existing parameter values) At
least one
1769 of the protocol versions (major
or minor or both) must change
1770
1771 HARDFORK-04a (x) At least 85% of
stake pools by active stake
should have
1772 upgraded to a Cardano Blockchain
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1773 processing the rules associated
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1774
1775 HARDFORK-05 (x) Any new updatable
protocol parameters that are
1776 introduced with a hard fork must
be included in this Appendix and
1777 suitable guardrails defined for
those parameters
1778
1779 HARDFORK-06 (x) Settings for any
new protocol parameters that are
1780 introduced with a hard fork must
be included in the appropriate
Genesis
1781 file
1782
1783 HARDFORK-07 (x) Any deprecated
protocol parameters must be
indicated in
1784 this Appendix
1785

1792 HARDFORK-08 (~ – no access to
Plutus cost model parameters)
New
1793 Plutus versions must be supported
by a version-specific *Plutus
cost
1794 model* that covers each primitive
that is available in the new
Plutus
1795 version
1796
1797 ### **5. Guardrails and
Guidelines on "Update Committee"
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1804 UPDATE-CC-01a (x) "Update
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1805 Ada Holders have ratified through
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1806 Constitution
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Guidelines on "New Constitution"
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1809
1810 "New Constitution" actions change
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1811 and the associated Guardrails
Script.
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1814
1815 NEW-CONSTITUTION-01a (x) A New
Constitution or Guardrails Script
1816 governance action must be
submitted to define any required
guardrails
1817 for new parameters that are
introduced via a Hard Fork
governance action

1786 HARDFORK-08 (~ – no access to
Plutus cost model parameters)
New
1787 Plutus versions must be supported
by a version-specific *Plutus
cost
1788 model* that covers each primitive
that is available in the new
Plutus
1789 version
1790
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1818
1819 NEW-CONSTITUTION-02 (x) If
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1820 consistent with this Constitution
1821
1822 **### **7. Guardrails and**
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actions**
1823
1824 "No Confidence" actions signal a
state of no confidence in the
1825 governance system. No guardrails
are imposed on "No Confidence"
actions.
1826
1827 **##### **GUARDRAILS****
1828
1829 - None
1830
1831 **### **8. Guardrails and**
Guidelines on "Info" actions**
1832
1833 "Info" actions are not enacted
on-chain. No guardrails are
imposed on
1834 "Info" actions.
1835
1836 **##### **GUARDRAILS****
1837
1838 - None
1839
1840 **### **9. List of Protocol**
Parameter Groups**
1841
1842 The protocol parameters are
grouped by type, allowing
different
1843 thresholds to be set for each
group.
1844
1845 The network parameter group
consists of:
1846
1847 - *maximum block body size*
(*maxBlockBodySize*)
1848
1849 - *maximum transaction size*
(*maxTxSize*)
1850
1851 - *maximum block header size*
(*maxBlockHeaderSize*)

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1852
1853 - *maximum size of a serialized
asset value* (*maxValueSize*)
1854
1855 - *maximum script execution
units in a single transaction*
1856 (maxTxExecutionUnits[steps])
1857
1858 - *maximum script execution
units in a single block*
1859
(*maxBlockExecutionUnits[steps]*)
1860
1861 - *maximum number of collateral
inputs* (*maxCollateralInputs*)
1862
1863 The economic parameter group
consists of:
1864
1865 - *minimum fee coefficient*
(*txFeePerByte*)
1866
1867 - *minimum fee constant*
(*txFeeFixed*)
1868
1869 - *minimum fee per byte for
reference scripts*
1870
(*minFeeRefScriptCoinsPerByte*)
1871
1872 - *delegation key lovelace
deposit* (*stakeAddressDeposit*)
1873
1874 - *pool registration lovelace
deposit* (*stakePoolDeposit*)
1875
1876 - *monetary expansion*
(*monetaryExpansion*)
1877
1878 - *treasury expansion*
(*treasuryCut*)
1879
1880 - *minimum fixed rewards cut
for pools* (*minPoolCost*)
1881
1882 - *minimum lovelace deposit per
byte of serialized UTx0*
1883 (*coinsPerUTx0Byte*)
1884
1885 - *prices of Plutus execution
units*

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1886 (*executionUnitPrices[priceSteps/
priceMemory]*)
1887
1888 The technical/security parameter
group consists of:
1889
1890 - *pool pledge influence*
(*poolPledgeInfluence*)
1891
1892 - *pool retirement maximum
epoch* (*poolRetireMaxEpoch*)
1893
1894 - *desired number of pools*
(*stakePoolTargetNum*)
1895
1896 - *Plutus execution cost
models* (*costModels*)
1897
1898 - *proportion of collateral
needed for scripts*
1899 (*collateralPercentage*)
1900
1901 The governance parameter group
consists of:
1902
1903 - *governance voting
thresholds*
(*dRepVotingThresholds[...],
1904 poolVotingThresholds[...]*)
1905
1906 - *governance action maximum
lifetime in epochs*
(*govActionLifetime*)
1907
1908 - *governance action deposit*
(*govDeposit*)
1909
1910 - *DRep deposit amount*
(*dRepDeposit*)
1911
1912 - *DRep activity period in
epochs* (*dRepActivity*)
1913
1914 - *minimal Constitutional
Committee size*
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1933 actors in the decentralized
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1934 the governance token of the
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1935 is a decentralized ecosystem of
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1951 directly as DReps – to act as the
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1952 voting.
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1956 inclusion of the Cardano
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