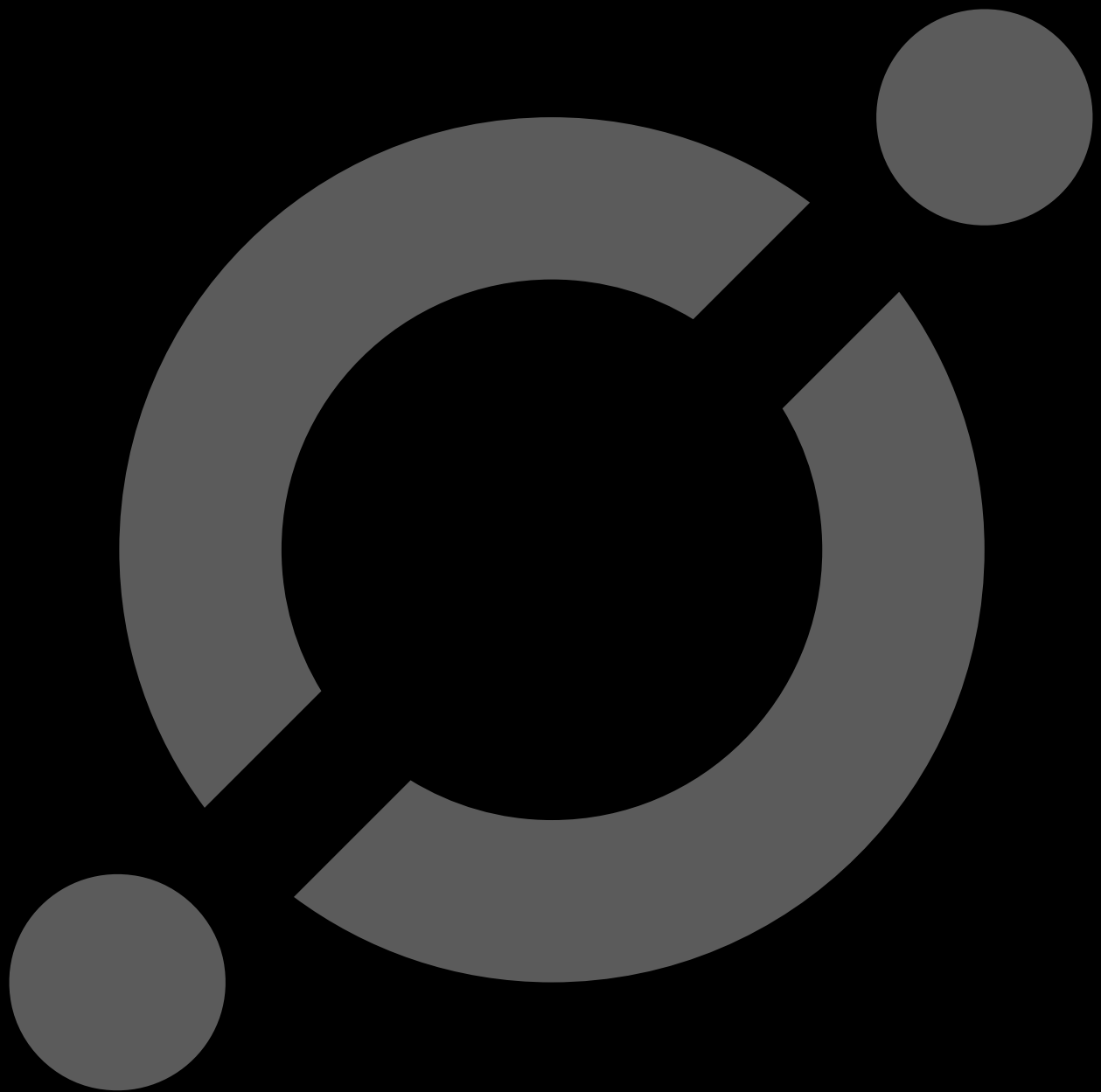


# ICON

# Incentives Scoring System <sup>EN</sup>

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ver 1.0



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# Introduction

The ICON Incentives Scoring System (IISS) is an artificial intelligence (AI) based assessment system that accurately measures one's contribution to the ICON Network. It is an essential component to a fair reward framework for ICONists. The philosophy of the ICON Network is embodied by the Delegated Proof of Contribution (DPoC) governance model, which creates an environment that encourages innovation and progress through unbiased and quantifiable reward policies. With such a model in place, each network participant can be assured that their contribution is immutable, provable, and fairly weighted against that of another ICONist. Each ICONist also has the right to delegate their contribution to whatever entity they see fit. This system has been designed to motivate each individual to act in accordance of traditional economic principles, where those that contribute most to society are rewarded accordingly.

IISS includes a wide range of information, from the distribution of tokens to the quantifiable measurement of an ICONist's contribution. This document goes on to explain the process of ICX issuance, distribution, the role of the Public Treasury, and the underlying calculation of I-Score, a quantifiable metric for fair distribution of accumulated ICX. Finally, we describe the penalty policy for behavior that negatively impacts the ICON Network.

Entities evaluated by IISS include: Representatives<sup>1</sup>, who produce and verify blocks on the ICON Network, DApps<sup>2</sup>, decentralized applications that run on the ICON Network, EEPs<sup>3</sup> (Ecosystem Expansion Projects), projects that aim to grow the ICON Ecosystem, and lastly ICONists, who contribute to the network through delegating their stake to another entity. Each participant will be able to demonstrate their contribution and receive appropriate rewards through ICON Network's unique contribution evaluation system.

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<sup>1</sup> Representatives are block producers and validators of the ICON Network, which consist of P-Reps (Public Representatives) and C-Reps (Community Representatives). All ICONists can delegate their stake to a certain representative.

<sup>2</sup> DApp refers to a decentralized application that operates one or more SCOREs (Smart Contract on Reliable Environment) on the ICON Network. All ICONists can evaluate DApps and delegate their stakes. The delegated DApp can be rewarded accordingly.

<sup>3</sup> EEP is a project that contributes to the growth and expansion of the ICON Network and ecosystem. The scope of an EEP includes ICON mainnet development, 3rd Party App development, community growth, educational initiatives, and so forth. All ICONists can propose and execute EEPs and receive a reward when they are delegated certain amount of stake from other ICONists. This allows all ICONists to contribute to the ICON Network by delegating their stake.

IISS utilizes a variety of artificial intelligence techniques to distribute contribution-based rewards to ICON Network participants. However, in order to construct an accurate and reliable artificial intelligence-based incentive distribution model, it is necessary to accumulate and analyze preliminary data. Therefore, we will operate the artificial intelligence-based evaluation system upon completing a sufficient data accumulation period.

Table 1 (below) introduces several concepts for establishing monetary policy using IISS. ICX price ( $P$ ) is the value submitted by delegates to reflect the current market price of ICX.  $I_{rep}$  is the Expected Monthly Reward per Representative,  $I_{eep}$  is the Expected Monthly Reward per 1% of the Total EEP Delegation, and  $I_{dapp}$  is the Expected Monthly Reward per 1% of the Total DApp Delegation. All of the aforementioned variables are estimates submitted by representatives, taking into account the operating costs and benefits of each representative, EEP, and DApp. Lastly, Representative Delegation Annual Reward Rate ( $r_{rep}$ ), EEP Delegation Annual Reward Rate ( $r_{eep}$ ), and DApp Delegation Annual Reward Rate ( $r_{dapp}$ ) are the adjustable rates submitted by representatives. The rates are calculated in such a way to mitigate the effects of inflation on the total staked value. The variables submitted by representatives (marked with an “O” in Table 1) are updated at the end of each block production round. Upon aggregating the submissions of each representative, the value of each variable is determined by a weighted average proportional to the stake of each delegate. The rest of the variables (marked with an “X” in Table 1) are determined according to network conditions. Monthly variables are based on a 30 day time frame, and annual variables are based on a 365 day time frame.

<b>Variables</b>	<b>Explanation</b>	<b>Submitted by representatives</b>
$P$	Market Price of ICX	O
$I_{rep}$	Expected Monthly Reward per Representative	O
$I_{eep}$	Expected Monthly Reward per 1% of the Total EEP Delegation	O
$I_{dapp}$	Expected Monthly Reward per 1% of the Total DApp Delegation	O
$r_{rep}$	Representative Delegation Annual Reward Rate	O
$r_{eep}$	EEP Delegation Annual Reward Rate	O
$r_{dapp}$	DApp Delegation Annual Reward Rate	O
$D_{rep-total}$	Total Delegated ICX to All Representatives	X
$D_{eep-total}$	Total Delegated ICX to All EEPs	X
$D_{dapp-total}$	Total Delegated ICX to All DApps	X

[Table 1] Definition of Variables in IISS

# Token Model

## 2.1. ICX

The base currency of the ICON Network is ICX, and all economic activities that take place in the ICON Network are based on the value of ICX. ICX can be used as a means of trade and as a reward for contribution to the ICON Network. Additionally, ICX can be locked through a staking mechanism and delegated to support a specific Representative, EEP, or DApp. This process enables ICONists to indirectly contribute to the growth of the ecosystem.

## 2.2. I-Score

I-Score, the score derived by IISS and used to quantify an ICONist's contribution, represents the right to claim ICX at any time from the Public Treasury. All ICONists can earn I-Score directly, by conducting activities that contribute to the ICON Network, or indirectly, by delegating their stakes to specific entities. I-Score can not be transferred among users, and only the user account can claim the ICX from the Public Treasury.

The definitions of the evaluation items of the I-Score are shown in Table 2.

Item	Description
<b>Representative Reward ( <math>\beta_1</math> )</b>	Reward for block production and verification when a representative produces and verifies a block
<b>Transaction Fee Reward ( <math>\beta_2</math> )</b>	Reward for the transaction fee included in the block when a representative produces and verifies a block
<b>Representative delegation reward ( <math>\beta_3</math> )</b>	Reward for delegation of a representative when ICONists delegate a representative
<b>EEP Reward ( <math>\beta_4</math> )</b>	Reward for delegation when an EEP is delegated by ICONists
<b>EEP Delegation Reward ( <math>\beta_5</math> )</b>	Reward for delegation of an EEP when ICONists delegate an EEP
<b>DApp Reward ( <math>\beta_6</math> )</b>	Reward for delegation when a DApp is delegated by ICONists
<b>DApp Delegation Reward ( <math>\beta_7</math> )</b>	Reward for delegation of DApp when ICONists delegate a DApp

[Table 2] I-Score Evaluation Items

# Token Issuance and Distribution

## 3.1. Token Issuance

The ICON Network issues a certain portion of tokens to compensate for contributions. The amount of tokens issued is determined by the amount of rewards entitled to each entity contributing to the development of the ICON Network. The annual issuance of tokens is designed not to exceed 15% of the total token amount. ICON Network's A.I. will generate a report by analyzing the network development and growth rate indicators. Each representative can refer to the report when deliberating monetary policy.

The A.I. will recommend the amount of ICX issuance by considering various network development and growth rate indicators, such as the total number of transactions, Representative reward amount, representative cost, EEP reward amount, DApp reward amount, average number of transactions per DApp, number of DApps, number of network users, and delegation rate of ICONists.

In the initial ICON Network, the values of the reward variables and the delegation reward rate for each item will be designed to promote the rapid development of the ICON ecosystem, however, they can be adjusted through consensus among the representatives. Once the ICON Network has grown sufficiently, variables can be adjusted to minimize rewards via currency issuance, and instead sustain itself with transaction fees, thereby preventing the depreciation of ICX value.

### 3.1.1. ICX Issuance

A specific amount of ICX and I-Score are issued every time a representative produces a block. The ICX is then deposited into the Public Treasury. At the same time, I-Score is distributed to ICONists based on their contribution to the ICON Network. ICONists can claim I-Scores in the form of ICX at any time.

ICX generated upon the production of a block is automatically stored in the Public Treasury. ICX gets distributed from the Public Treasury according to the ICONist's I-Score held at the time of the claim. ICX generated per block is calculated and published based on the amount of rewards to be paid for contribution. The calculation method of ICX issuance per block is shown in Table 3 below.

Item	Type	Description
<b>Representative Reward ( <math>\beta_1</math> )</b>	Calculation Method of Issuance	Expected annual ICX issuance per block for reward for being a Representative Reward is calculated based on the expected monthly costs and benefits for representatives, number of representatives, and the value of ICX.
	Formula	$\beta_1 = \frac{I_{rep} \times 12 \text{ months} \times \# \text{ of representatives}}{\# \text{ of blocks produced annually}} \times \frac{1}{P}$
<b>Representative Delegation Reward ( <math>\beta_3</math> )</b>	Calculation Method of Issuance	Expected ICX issuance for reward for delegation of a Representative Reward is calculated based on the total delegated amount to all representatives and representative delegate reward rate.
	Formula	$\beta_3 = \frac{r_{rep} \times D_{rep-total}}{\# \text{ of blocks produced annually}}$
<b>EEP Reward ( <math>\beta_4</math> )</b>	Calculation Method of Issuance	The annual ICX issuance per block to be paid to an EEP as a reward is calculated based on the monthly expected earnings of an EEP when delegated with 1% of the total EEP delegation, and the value of ICX.
	Formula	$\beta_4 = \frac{I_{eep} \times 12 \text{ month} \times 100}{\# \text{ of blocks produced annually}} \times \frac{1}{P}$
<b>EEP Delegation Reward ( <math>\beta_5</math> )</b>	Calculation Method of Issuance	Expected ICX issuance for reward for delegating to an EEP is calculated based on the total delegated amount to all EEPs and the EEP delegate reward rate.
	Formula	$\beta_5 = \frac{r_{eep} \times D_{eep-total}}{\# \text{ of blocks produced annually}}$
<b>DApp Reward ( <math>\beta_6</math> )</b>	Calculation Method of Issuance	The annual ICX issuance per block to be paid to a DApp as a reward is calculated based on the monthly expected earnings of a DApp when delegated with 1% of the total DApp delegation, and the value of ICX.
	Formula	$\beta_6 = \frac{I_{dapp} \times 12 \text{ month} \times 100}{\# \text{ of blocks produced annually}} \times \frac{1}{P}$

<b>DApp Delegation Reward ( <math>\beta_7</math> )</b>	Calculation Method of Issuance	Expected ICX issuance for reward for delegating to a DApp is calculated based on the total delegated amount to all DApps and the DApp delegate reward rate.
	Formula	$\beta_7 = \frac{r_{dapp} \times D_{dapp-total}}{\# \text{ of blocks produced annually}}$

[Table 3] ICX Issuance Amount per Block by Sector

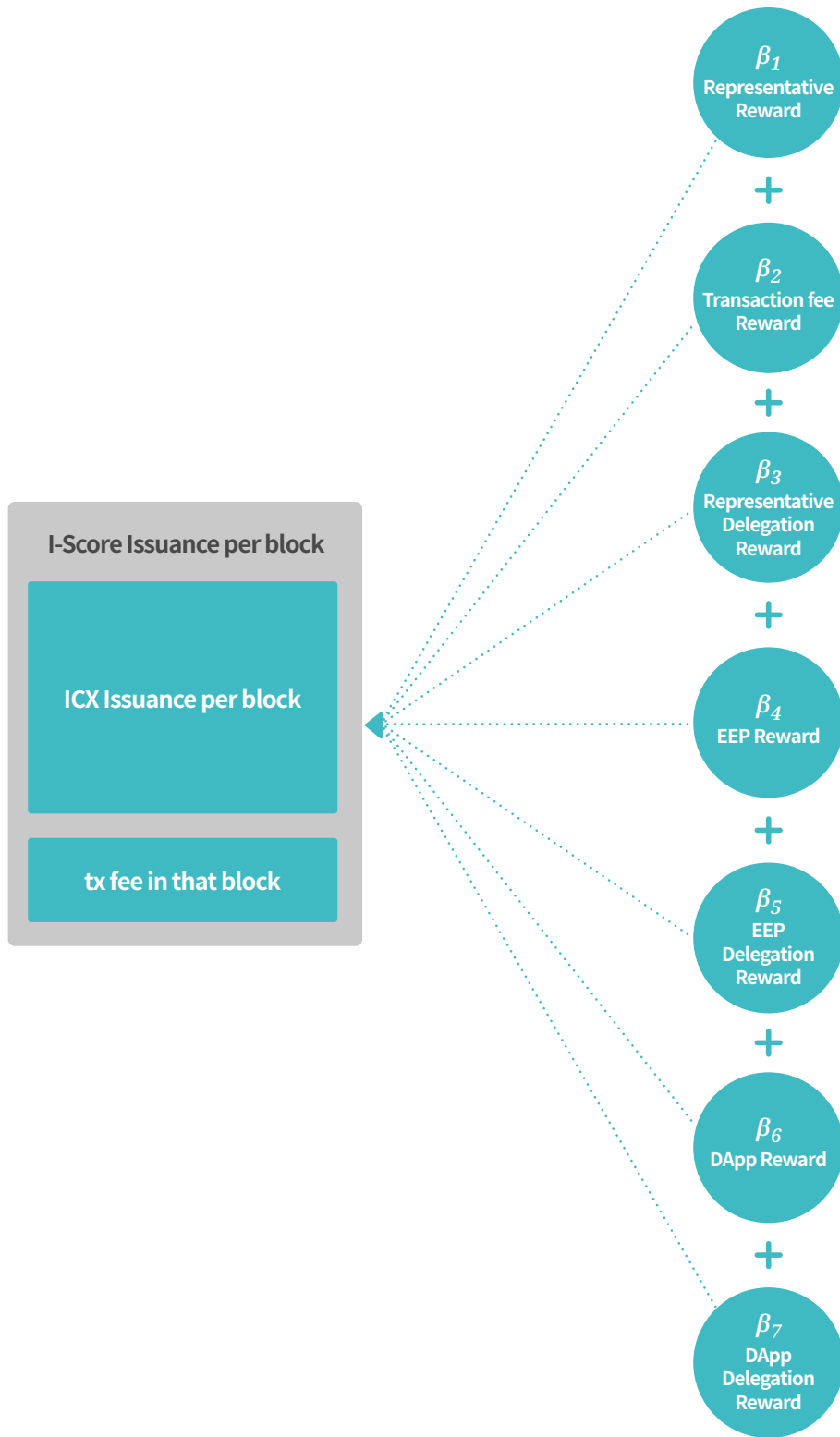
$$\text{ICX Issuance per Block} = \beta_1 + \beta_3 + \beta_4 + \beta_5 + \beta_6 + \beta_7$$

$$\text{Annual Issuance Rate} = \frac{\text{ICX Issuance amount per block} \times \# \text{ of annual block production}}{\text{Total number of ICX Issued}}$$

### 3.1.2. I-Score Issuance

The I-Score issuance per block is determined by the sum of the ICX issuance per block and the transaction fees per block. I-Score is then immediately distributed according to each contributor's contribution. The sum of  $\beta_n$  is the amount of ICX that is paid to the Public Treasury when a block is created. The exchange rate between ICX and I-Score is fixed at  $1 \text{ ICX} = 1,000 \text{ I\_score}$ . If the produced block contains transaction fees, the transaction fees (ICX) will be sent to the Public Treasury and a corresponding amount of I-Score will be distributed to each representative involved in producing and validating the block. Section 4 details an example to help illustrate the aforementioned concepts.

$$\text{I\_score Issuance per block} = (\text{ICX Issuance per block} + \text{tx fee in that block}) \times 1,000$$



[Figure 1] Composition of I-Score Issuance

### 3.1.3. Example of Token Issuance

For the sake of this example, Table 4 has been populated with assumptions, such as a network comprised of 22 representatives, to walk through the calculation of ICX issuance.

Item	Value
Market Price of ICX ( $P$ )	\$0.25
Expected Monthly Reward per Representative ( $I_{rep}$ )	\$15,000
Expected Monthly Reward per 1% of the Total EEP Delegation ( $I_{eep}$ )	\$4,000
Expected Monthly Reward per 1% of the Total DApp Delegation ( $I_{dapp}$ )	\$4,000
Representative Delegation Annual Reward Rate ( $r_{rep}$ )	3.0%
EEP Delegation Annual Reward Rate ( $r_{eep}$ )	3.0%
DApp Delegation Annual Reward Rate ( $r_{dapp}$ )	3.0%
Total number of ICX Issued	800,460,000
Delegation Rate	25%
Total Delegated ICX to All Representatives ( $D_{rep-total}$ )	$800,460,000 \times 25\% = 200,115,000$
Total Delegated ICX to All EEPs ( $D_{eep-total}$ )	$800,460,000 \times 25\% = 200,115,000$
Total Delegated ICX to All DApps ( $D_{dapp-total}$ )	$800,460,000 \times 25\% = 200,115,000$
Block Production Time	2 seconds
Annual Block Production	15,768,000

[Table 4] Example of Initial Values for Each Variable

Item	Value
Representative Reward ( $\beta_1$ )	$\frac{15,000 \times 12 \times 22}{15,768,000} \times \frac{1}{0.25} = 1.0046 \text{ ICX}$
Transaction Fee Reward ( $\beta_2$ )	-
Representative Delegation Reward ( $\beta_3$ )	$\frac{3.0\% \times 200,115,000}{15,768,000} = 0.3807 \text{ ICX}$
EEP Reward ( $\beta_4$ )	$\frac{4,000 \times 100 \times 12}{15,768,000} \times \frac{1}{0.25} = 1.2177 \text{ ICX}$
EEP Delegation Reward ( $\beta_5$ )	$\frac{3.0\% \times 200,115,000}{15,768,000} = 0.3807 \text{ ICX}$
DApp Reward ( $\beta_6$ )	$\frac{4,000 \times 100 \times 12}{15,768,000} \times \frac{1}{0.25} = 1.2177 \text{ ICX}$
DApp Delegation Reward ( $\beta_7$ )	$\frac{3.0\% \times 200,115,000}{15,768,000} = 0.3807 \text{ ICX}$
ICX Issuance per block	4.5821 ICX = 4582.1 $I_{score}$
Yearly Issuance rate	$\frac{\text{ICX Issuance amount per block} \times \text{\# of annual block production}}{\text{Total number of ICX issued}} = 9.026\%$

[Table 5] Example of ICX Issuance for Each Sector

## 3.2. I-Score Distribution

The ICON Network measures the contribution of ICONists through the use of IISS and distributes I-Score accordingly. Each ICONist obtains an I-Score for each reward item and can claim the ICX from the Public Treasury. The amount of I-Score acquired per block is derived based on the items in the table below.

Item	Type	Description
<b>Representative Reward</b>	Contribution Measuring Method	When one produces a block, one gets 50% of the reward that is issued per block. When one participates in the block verification, one divides the remaining 50% of the reward issued per block by the number of representatives who participated in the block verification
	Distribution Formula	$\beta_1 \times 0.5 \times ( \text{Whether Produces Block (0 or 1)} + \frac{\text{Whether Verifies block (0 or 1)}}{\# \text{ of representative thats verified the block}} )$
<b>Transaction Fee Reward</b>	Contribution Measuring Method	When one is involved in producing or validating a block, the total sum of transaction fees in the block is divided by the number of representatives involved in the block production or verification
	Distribution Formula	$\beta_2 \times \frac{\text{Whether Produces Block (0 or 1)} + \text{Whether Verifies block(0 or 1)}}{1 + \# \text{ of representatives that verified the block}}$
<b>Representative Delegation Reward</b>	Contribution Measuring Method	Acquired as much as one has delegated to a representative
	Distribution Formula	$\beta_3 \times \frac{\text{delegate amount}}{\text{Total delegated amount to all representatives}}$
<b>EEP Reward</b>	Contribution Measuring Method	Acquired as a proportion of one's delegated amount to the total delegated amount to all EEPs
	Distribution Formula	$\beta_4 \times \frac{\text{delegated amount from ICONist}}{\text{Total delegated amount to all EEPs}}$

<b>EEP Delegation Reward</b>	Contribution Measuring Method	Acquired as much as one has delegated to an EEP
	Distribution Formula	$\beta_5 \times \frac{\text{delegate amount}}{\text{Total delegated amount to all EEPs}}$
<b>DApp Reward</b>	Contribution Measuring Method	Acquired as a proportion of one's delegated amount to the total delegated amount to all DApps
	Distribution Formula	$\beta_6 \times \frac{\text{delegated amount from ICONist}}{\text{Total delegated amount to all DApps}}$
<b>DApp Delegation Reward</b>	Contribution Measuring Method	Acquired as much as one has delegated to a DApp
	Distribution Formula	$\beta_7 \times \frac{\text{delegate amount}}{\text{Total delegated amount to all DApps}}$

[Table 6] I-Score Unit of Measurement

***I\_score Acquisition per block =***

$$\begin{aligned}
 & \beta_1 \times 0.5 \times (\text{Whether Produces Block (0 or 1)} + \frac{\text{Whether Verifies block (0 or 1)}}{\# \text{ of representatives that verified the block}} \\
 & + \beta_2 \times \frac{\text{Whether Produces Block (0 or 1)} + \text{Whether Verifies block (0 or 1)}}{1 + \# \text{ of representatives that verified the block}} \\
 & + \beta_3 \times \frac{\text{delegate amount}}{\text{Total delegated amount to all representatives}} + \beta_4 \times \frac{\text{delegated amount from ICONist}}{\text{Total delegated amount to all EEPs}} \\
 & + \beta_5 \times \frac{\text{delegate amount}}{\text{Total delegated amount to all EEPs}} + \beta_6 \times \frac{\text{delegated amount from ICONist}}{\text{Total delegated amount to all DApps}} \\
 & + \beta_7 \times \frac{\text{delegate amount}}{\text{Total delegated amount to all DApps}}
 \end{aligned}$$

In the previous example, sufficient rewards were provided to Representatives to incentivize honest behavior and network stability, rewards were provided to DApp developers to incentivize more builders to come to the ICON Ecosystem, and finally, rewards were allocated to EEPs to incentivize teams or individuals to come together and foster the growth of the ICON Ecosystem. These types of rewards are set to encourage economic expansion and growth given the state of the ICON Ecosystem.

### 3.3. Token Claim

The Public Treasury on the ICON Network allows ICONists to claim ICX in exchange for their I-Score. The exchange rate is fixed at  $ICX : I\_score = 1 : 1000$ . When an ICONist claims their ICX, their I-Score is extinguished and the corresponding ICX is paid to their account from the Public Treasury.

## Scenario

ICONist A is a very active ICONist with 10,000 ICX that participates in all delegations by staking all 10,000 ICX. ICONist A can stake 10,000 ICX per category (Representative, EEP, DApp). The total network has 800,460,000 ICX, of which 25% is reserved and delegated to all reward-bearing items. At this time, the I-Score that ICONist A acquires per block is as follows:

$$\begin{aligned} \text{ICONist A's acquired I\_score} = & (\beta_3 \times \frac{10,000}{800,460,000 \times 0.25} + \beta_5 \times \frac{10,000}{800,460,000 \times 0.25} \\ & + \beta_7 \times \frac{10,000}{800,460,000 \times 0.25}) \times 1,000 \end{aligned}$$

P-Rep B is delegated 2% of the entire network and is acting as a representative. P-Rep B produced this block, and another 15 P-Reps participated in the verification of that block. Assuming that the transaction fee ( $\beta_2$ ) in the block is 0.1 ICX, the I-Score that P-Rep B will acquire from this block is as follows:

$$\text{P-Rep B's acquired I\_score} = \{(\beta_1 \times 0.5 \times 1) + (0.1 \times \frac{1}{1 + 15})\} \times 1,000$$

ICONist C is an enthusiastic ICONist performing DApp development and an EEP. The total network has 800,460,000 ICX, of which 25% is reserved and 25% is delegated to EEPs and DApps, respectively. Through his EEP activities, he obtained 7% of the total EEP delegation, and the DApp, which he developed, was also very popular on the ICON Network and obtained 9% of the total DApp delegation. In this case, the amount of I-Score per block to be acquired by ICONist C is as follows:

$$\text{ICONist C's acquired I\_score} = (\beta_4 \times \frac{800,460,000 \times 0.25 \times 0.07}{800,460,000 \times 0.25} + \beta_6 \times \frac{800,460,000 \times 0.25 \times 0.09}{800,460,000 \times 0.25}) \times 1,000$$

# Penalty

A representative of the ICON Network is classified as either a leader node responsible for block production or a verification node responsible for block verification. Penalty Score is given when performing malicious behavior as shown in Table 7 below. Once a benchmark Penalty Score is accumulated, a penalty, such as node suspension, will be enforced through the principle of governance between representatives. Details regarding Penalty Score benchmarks will be shared in a separate document.

Type	Description	Penalty Score
1-1	When a leader node proposes an invalid block	100
1-2	If the leader node does not suggest a block	2
2-1	If the validation node agrees with an invalid block	100
2-2	If the validation node does not agree with a valid block	100
2-3	If the verification node performs a double vote in one round	100

[Table 7] IISS Penalty Criteria