Detailed computation of the risk assessment

Ranwa Al Mallah

LiTrans, Ryerson University, Ontario, Canada

David López

GiiTraL, Universidad Nacional Autónoma de México, Mexico City, Mexico

Bilal Farooq

LiTrans, Ryerson University, Ontario, Canada

1. Detailed computation of the risk assessment

The risk of an impact of an attack goal at a valid scenario is computed as follows:

$$R_T(G_i, S_j) = I_T(G_i) \times P_{MAX}(G_i, S_j)$$

such that:

$f : S_j \mapsto G_i : f$ is given by Table 1
  $T \in$ {monetary,privacy,integrity,trust}
  $i \in$ {1,2...,5}
  $j \in$ {1,2...,22}

Table 1: Possible scenarios per attack goal

Attack goal	Label	Scenarios
Gain knowledge about the data-market	G_1	$S_1, S_3, S_4, S_7, S_8, S_{10}, S_{12}, S_{20}$
Access sensitive data on the nodes of the network	G_2	$S_1, S_3, S_4, S_7, S_8, S_{10}, S_{12}, S_{20}$
Manipulate and modify blockchain information	G_3	$S_1, S_{10}, S_{11}, S_{14}, S_{15}, S_{16}, S_{17}, S_{18}, S_{19}, S_{21}$
Sabotage activities	G_4	$S_1, S_2, S_5, S_6, S_7, S_8, S_9, S_{10}. \ S_{11}, S_{12}, S_{13}, S_{14}, S_{15}. \ S_{16}, S_{17} \ S_{18}, S_{19}, S_{21}, S_{22}$
Induce participants in the blockchain network to make errors	G_5	$S_1, S_2, S_5, S_6, S_7, S_8, S_9, S_{10}. \ S_{11}, S_{12}, S_{13}, S_{14}, S_{15}. \ S_{16}, S_{17} \ S_{18}, S_{19}, S_{21}, S_{22}$

In Table 2, we present the results of the combined risk assessment for a given attack goal, scenario and impact type:

Email addresses: `ranwa.almallah@ryerson.ca` (Ranwa Al Mallah), `dlopezfl@iingen.unam.mx` (David López), `bilal.farooq@ryerson.ca` (Bilal Farooq)

Table 2: Combined risk assessment - m : Monetary, p : Privacy, in : Integrity, t : Trust

Goal	S_j	P_{MAX}	Monetary I_m	R_m	Privacy I_p	R_p	Integrity I_{in}	R_{in}	Trust I_t	R_t
G_1	S_1	9	1	9	2	18	-	-	1	9
	S_3	7	1	7	2	14	-	-	1	7
	S_4	8	1	8	2	16	-	-	1	8
	S_7	6	1	6	2	12	-	-	1	6
	S_8	7	1	7	2	14	-	-	1	7
	S_{10}	4	1	4	2	8	-	-	1	4
	S_{12}	5	1	5	2	10	-	-	1	5
	S_{20}	6	1	6	2	12	-	-	1	6
G_2	S_1	9	2	18	3	27	-	-	2	18
	S_3	7	2	14	3	21	-	-	2	14
	S_4	7	2	14	3	21	-	-	2	14
	S_7	6	2	12	3	18	-	-	2	12
	S_8	7	2	14	3	21	-	-	2	14
	S_{10}	5	2	10	3	15	-	-	2	10
	S_{12}	5	2	10	3	15	-	-	2	10
	S_{20}	6	2	12	3	18	-	-	2	12
G_3	S_1	8	3	24	2	16	4	32	4	32
	S_{10}	8	3	24	2	16	4	32	4	32
	S_{11}	11	3	33	2	22	4	44	4	44
	S_{14}	7	3	21	2	14	4	28	4	28
	S_{15}	5	3	15	2	10	4	20	4	20
	S_{16}	5	3	15	2	10	4	20	4	20
	S_{17}	6	3	18	2	12	4	24	4	24
	S_{18}	7	3	21	2	14	4	28	4	28
	S_{19}	6	3	18	2	12	4	24	4	24
	S_{21}	8	3	24	2	16	4	32	4	32
G_4	S_1	10	3	30	-	-	2	20	3	30
	S_2	12	3	36	-	-	2	24	3	36
	S_5	7	3	21	-	-	2	14	3	21
	S_6	5	3	15	-	-	2	10	3	15
	S_7	7	3	21	-	-	2	14	3	21
	S_8	7	3	21	-	-	2	14	3	21
	S_9	6	3	18	-	-	2	12	3	18
	S_{10}	7	3	21	-	-	2	14	3	21
	S_{11}	10	3	30	-	-	2	20	3	30
	S_{12}	6	3	18	-	-	2	12	3	18
	S_{13}	6	3	18	-	-	2	12	3	18
	S_{14}	7	3	21	-	-	2	14	3	21
	S_{15}	6	3	18	-	-	2	12	3	18
	S_{16}	5	3	15	-	-	2	10	3	15
	S_{17}	5	3	15	-	-	2	10	3	15
	S_{18}	9	3	27	-	-	2	18	3	27
	S_{19}	6	3	18	-	-	2	12	3	18
	S_{21}	8	3	24	-	-	2	16	3	24
	S_{22}	11	3	33	-	-	2	22	3	33
G_5	S_1	10	2	20	-	-	3	30	3	30
	S2	12	2	24	-	-	3	36	3	36
	S_5	6	2	12	-	-	3	18	3	18
	S_6	5	2	10	-	-	3	15	3	15
	S_7	7	2	14	-	-	3	21	3	21
	S_8	7	2	14	-	-	3	21	3	21
	S_9	5	2	10	-	-	3	15	3	15
	S_{10}	4	2	8	-	-	3	12	3	12
	S_{11}	11	2	22	-	-	3	33	3	33
	S_{12}	6	2	12	-	-	3	18	3	18
	S_{13}	5	2	10	-	-	3	15	3	15
	S_{14}	8	2	16	-	-	3	24	3	24
	S_{15}	4	2	8	-	-	3	12	3	12
	S_{16}	4	2	8	-	-	3	12	3	12
	S_{17}	5	2	10	-	-	3	15	3	15
	S_{18}	8	2	16	-	-	3	24	3	24
	S_{19}	4	2	8	-	-	3	12	3	12
	S_{21}	7	2	14	-	-	3	21	3	21
	S_{22}	12	2	24	-	-	3	36	3	36