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Reliability of ID Authentication and ID Information in Online Voting

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Background

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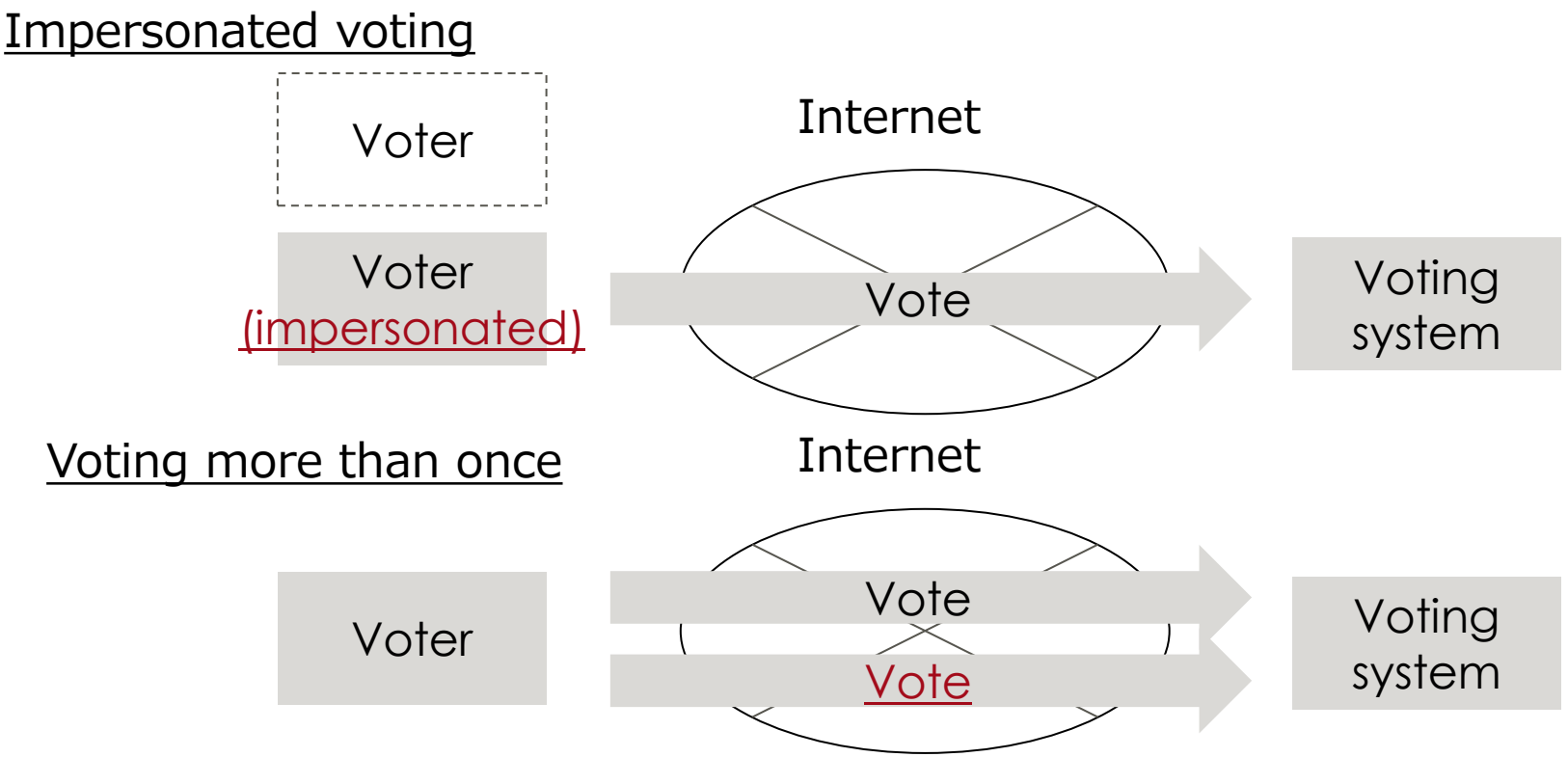

- For voting rights to be execused in accordance with the principle of "one person, one vote," it is necessary that the voter's identity, as well as the reliability of the voter's identity (ID) information, be verified.
  - Impersonated voting: The voter's voting rights are executed by another person.
  - Voting more than once: A single voter is able to execute voting rights a number of times.

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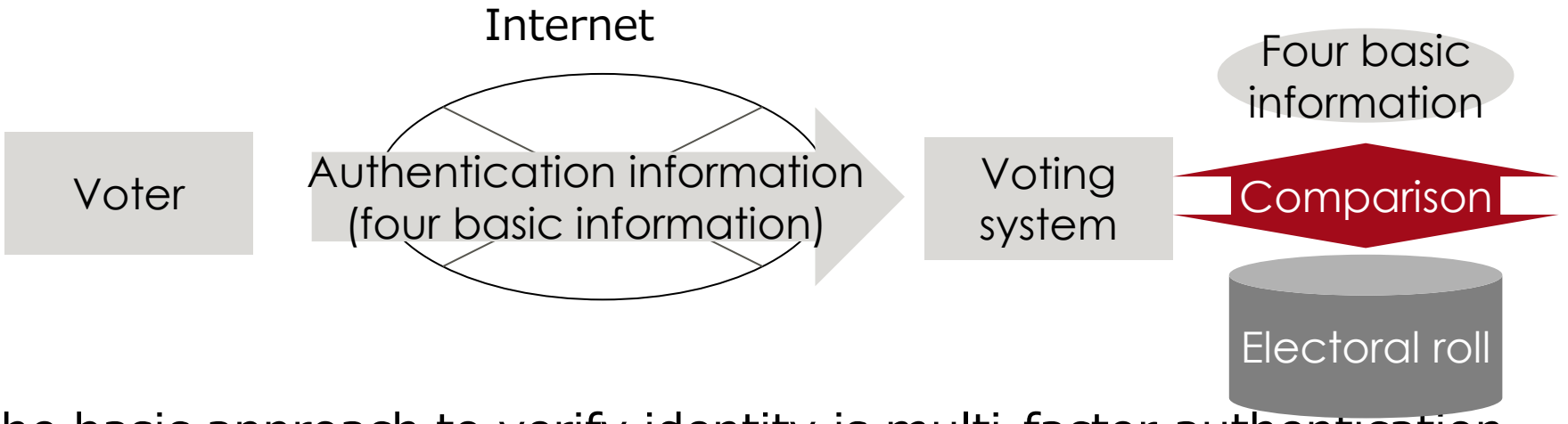
Hypothesis



- The basic approach to verify identity is multi-factor authentication using the My Number Card along with some supplemental measures.
  - The voter transmits the four information to the voting system.
    - The four basic information: Name, gender, address, and date of birth
  - The voting system verifies the voter's identity by comparing the four basic information to the ones on the electoral roll.
- Other
  - Voting entirely remotely by using smartphones/PCs is main operation, but polling places are also set up for those who are unable to use such devices.
  - When voters move overseas, they return their "My Number" Card.
  - A variety of documents (e.g., early voting affidavits, overseas voter certifications) are digitized with electronic signatures.

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Issues

Partial list

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No.	Name of use case	Details
1	Preventing fraudulent voting	What can we do if a voter's My Number Card and PIN somehow get obtained by another person?
2	Carrying out remote proxy voting	Suppose, for example, that during the voting period, for reasons such as illness, voters are unable to use their My Number Card or input their PIN on their own and want to have someone else vote instead of them. How should such proxy voting be carried out?
3	Preventing fraud in early voting	If a voter submits an early voting affidavit in advance but, when voting, is present at his/her registered address during the voting period, this represents an irregularity. Could it mean that the early voting affidavit was submitted fraudulently by someone else?
4	Implementation of voting abroad without My Number Cards	If a voter returns his/her My Number Card when moving overseas, how should the identity of that voter be verified while he/she is overseas?
5	Preventing coercion in voting	What can be done so that people are not coerced to vote through intimidation?

- Although ordinarily identity is verified using the My Number Card along with supplemental measures, there are also some (very complex) exceptional cases in which it would be difficult to verify identity using just those means.

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Approach

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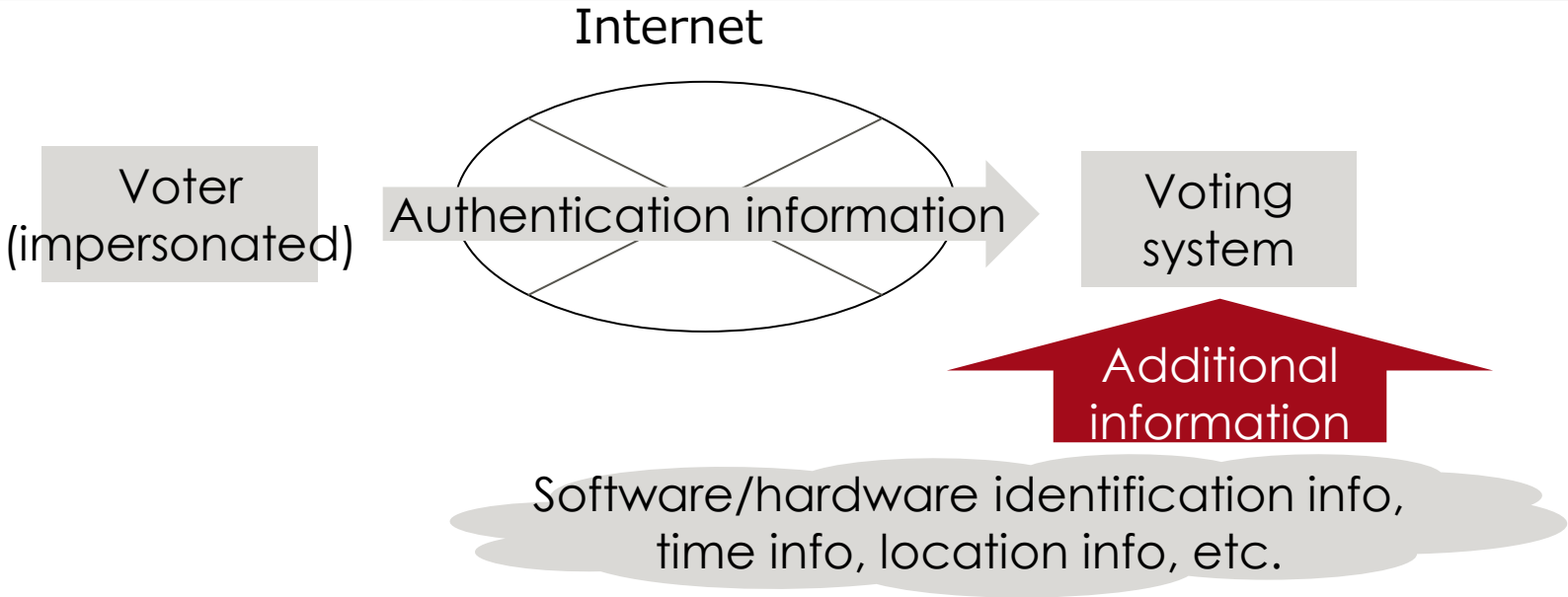

- It's difficult to deal with all potential exceptional situations.
- In addition to the My Number Card and supplemental measures, a variety of other information should be used to make identity verification as accurate as possible while satisfying the following criteria:
  - Impact of digital divide: Will it be possible for those who aren't familiar with IT technology to vote?
  - Monetary cost: Is the expense realistic?
  - Information reliability: How reliable is the information?

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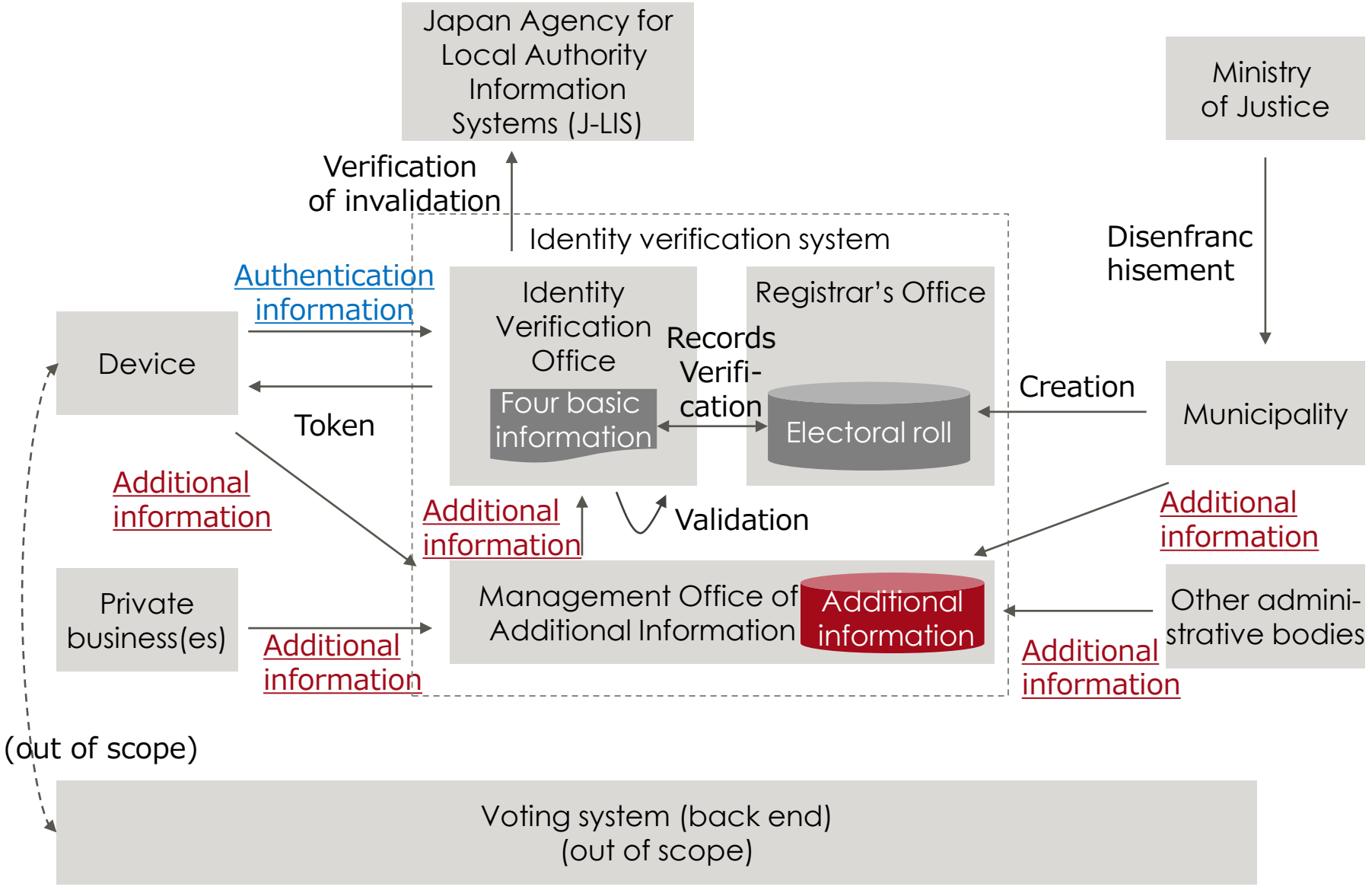
System example



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Additional information

Partial list

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No.	Information used	Impact of digital divide	Monetary cost	Information reliability	Example
1	Statement from voter	Minor	Low	Low	Was an early voting affidavit submitted?
2	Time information	Minor	Low	Low	Is the person attempting to vote early?
3	Location information	Minor	Low	Low	Is the person surely overseas/hospitalized?
4	Software/hardware identification	Minor	Low	Low	Is the UA or the IP address suspicious?
5	Device proximity	Minor	High	High	Is the device actually close to a certain location? (beacon)
6	Physical information	Minor	High	High	Is the person who is visibly present at the polling station attempting to vote?
7	Biological information	Major	High	Medium	Is the person's heart rate or sweating abnormal? (Is the person being threatened?)
8	Activity information	Major	Low	Low	Has the voting date been recorded in the person's electronic calendar service?

- From the standpoint primarily of cost, using some combination of 1–4 above would be a realistic way to strengthen identity verification.

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Proposed solution

Partial list

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No.	Name of use case	Additional information that can be used	Details
1	Preventing fraudulent voting	• Software/hardware identification information	Create an IP address blacklist as an additional information in advance. When the person logs into the voting system, verify whether his/her IP address is on the blacklist or not.
2	Carrying out remote proxy voting	• Statement from voter • Biological information • Physical information	Register the information reported by the voter, the voter's biological information, and information on the proxy (including signature) who will be voting on behalf of the voter in advance. During the voting period, the voter logs in the system using the biological information and and confirms that he/she will approve vote by proxy. After that, the proxy votes on behalf of the voter.
3	Preventing fraud in early voting	• Statement from voter • Time information • Location information	Having voters submit not just an application for early voting but also evidence of the application (e.g., an attestation from a reliable company stating that the voter has been ordered to take a work-related trip). This will prevent from fraudulently submitting an early voting affidavit by anyone else .
4	Implementation of voting abroad without My Number Cards	• Statement from voter	A voter receives an electronic certificate stating that he/she is eligible to vote abroad via e-mail or other means , when he/she moves overseas. When it is time for the voter to vote from overseas, the voter proves his/her eligibility to vote using the electronic certificate instead of his/her "My Number" Card.
5	Preventing coercion in voting	• Biological information	At the polling station, the voter's heart rate, body temperature, etc., are measured in order to assess whether the voter is in a psychologically and physically normal state when attempting to vote. In some cases, a staff member might personally interact with the voter verbally or in other ways.

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Consideration

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- We still have to explore a method that satisfies all the criteria below.
  - One person, one vote:
    The voting system must comply with the principle of “one person, one vote.”
  - Transparency:
    The voter wants to verify that the vote that he/she casts actually gets counted.
  - Anonymity:
    The fact that someone voted (and for whom) must not be disclosed.
- Examples
  - If, in order to prevent people from voting more than once (i.e., to comply with the principle of “one person, one vote”), the identity verification system manages information on who has already voted (personal information) in an unsophisticated way, then anonymity might be compromised.
  - If, for the sake of giving voters a way to know that their votes have actually been counted (transparency), the identity verification system manages information on who voted for whom in an unsophisticated way, then anonymity might be compromised.

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Summary

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- Issue: There are some exceptional cases that cannot be handled using only the My Number Card and supplemental measures.
- Approach: Use additional information to improve the accuracy of identity authentication.
  - Statement from voter
  - Time information
  - Location information
  - Software/hardware identification information
- We still have to explore a method that satisfies all the criteria below.
  - One person, one vote:
    The voting system must comply with the principle of “one person, one vote.”
  - Transparency:
    The voter wants to verify that the vote that he/she casts actually gets counted.
  - Anonymity:
    The fact that someone voted (and for whom) must not be disclosed.
- Other
  - It might be good if a variety of information (e.g., certificates of eligibility to vote overseas), etc., were digitized, and become possible to be distributed on blockchain (perhaps only for meta-information).

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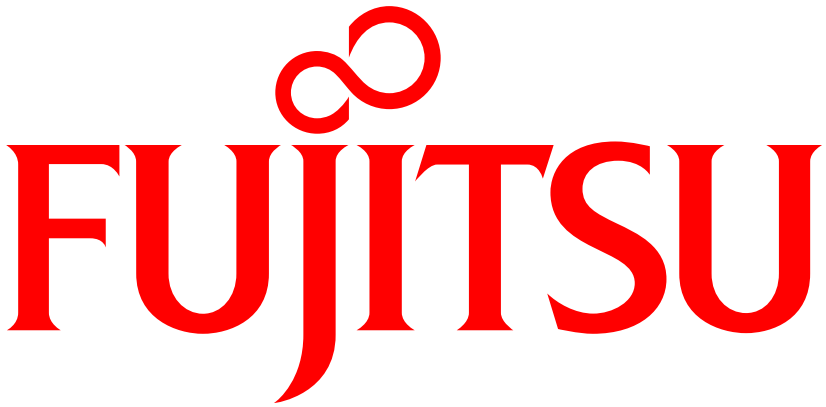

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