Network Bandwidth Guarantee of Data Transmission in High Energy Physics Experiments

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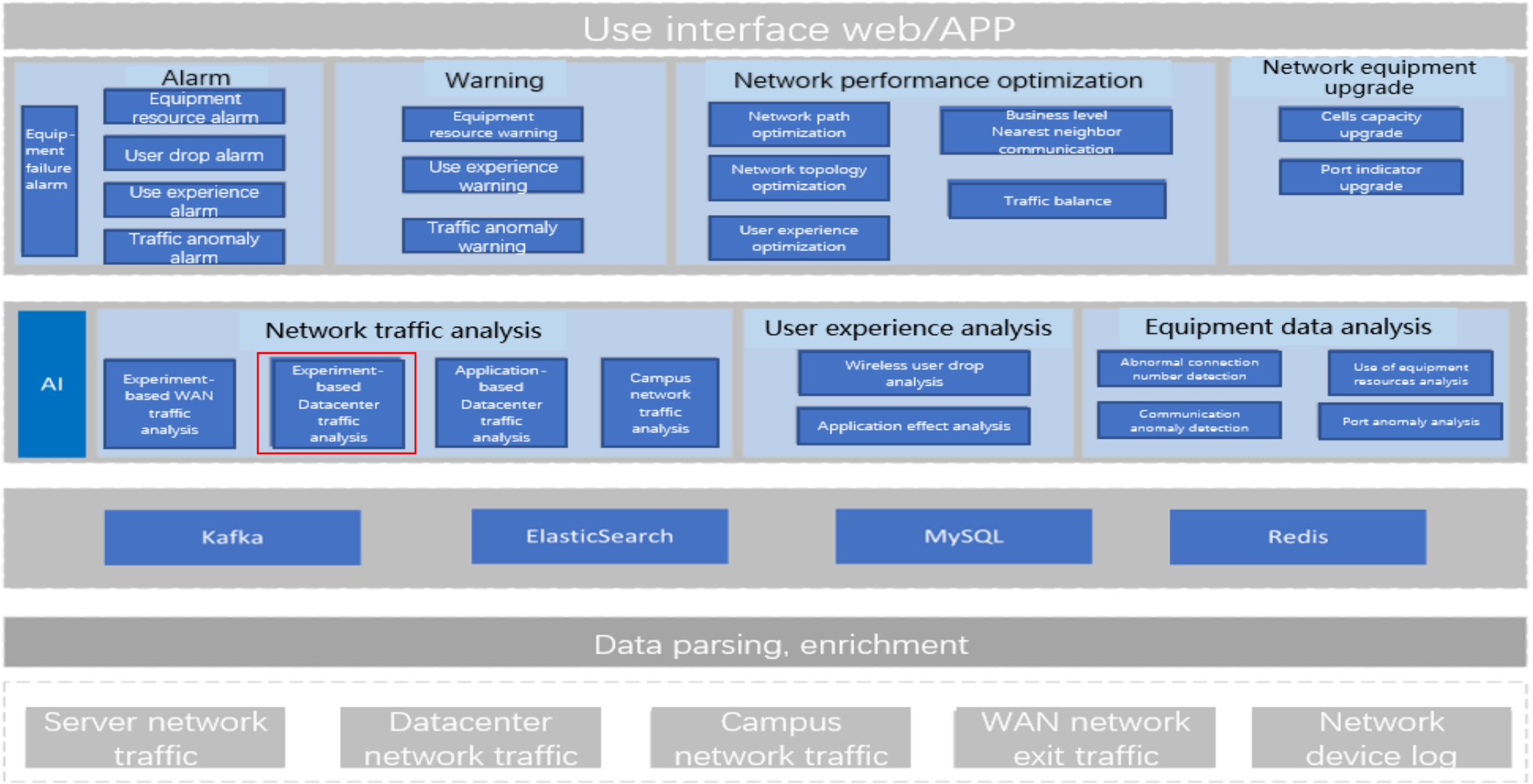
Outline

- Background & Introduction
- Purpose
- Prediction module
- Future plan
- Summary

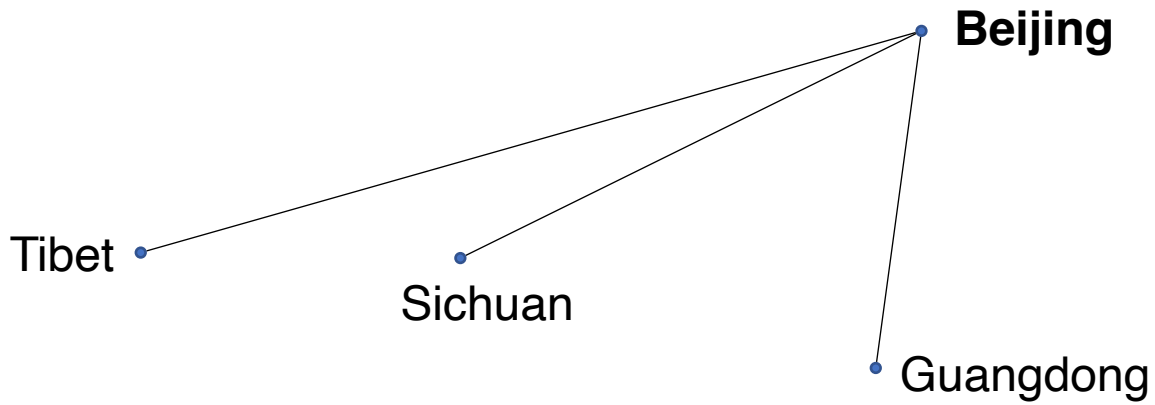
Background—Network requirements



Introduction

Features

- High energy physics experiments are region-crossing
  - Experimental devices and data centers are built separately.
  - Remote data transmission is required.



Introduction

Features

- Network links between experiments and data centers are shared
  - Data from different experiments is transmitted through the same link.
  - Some experimental data requires the link to guarantee its transmission.

Introduction

Typical use case

Instruction

Problems to be solved

- Bandwidth allocation is static for different assignments.
- The allocation of bandwidth is modified manually.
- The guarantee of assignments transmission depends on experience.

Introduction

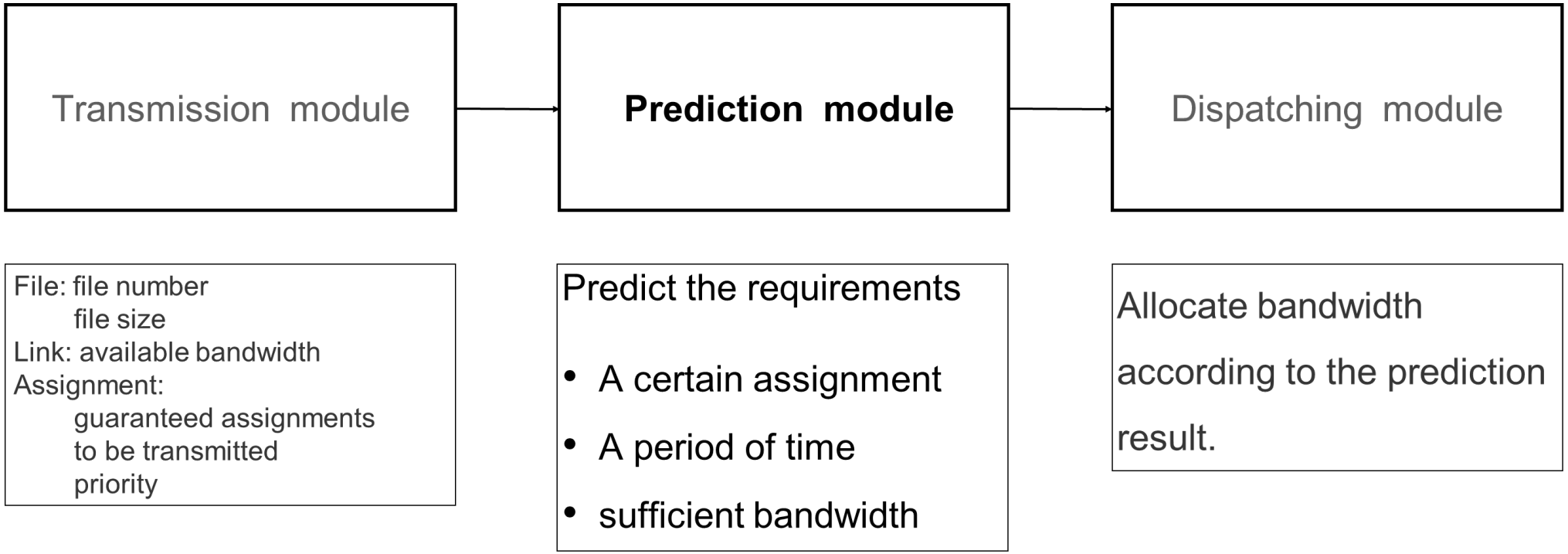
Problems to be solved

- Experiments in Dongguan and Jiangmen are sharing the only channel.
- Resources (bandwidth…) should be allocated to assignments in a planned way
  - *Automatic :*
    - The system allocates the resources automatically according to the received information ,including file size, file numbers…
  - *Dynamic :*
    - The allocation of resources is dynamically adjusted with the progress of transmission.
  - *Conditional :*
    - The allocation should be satisfied the priority requirements of the assignments.

Purpose

Prediction module

- *Prediction module* provides suggestions for subsequent system.
- The prediction results can ensure data transmit successfully.



Purpose

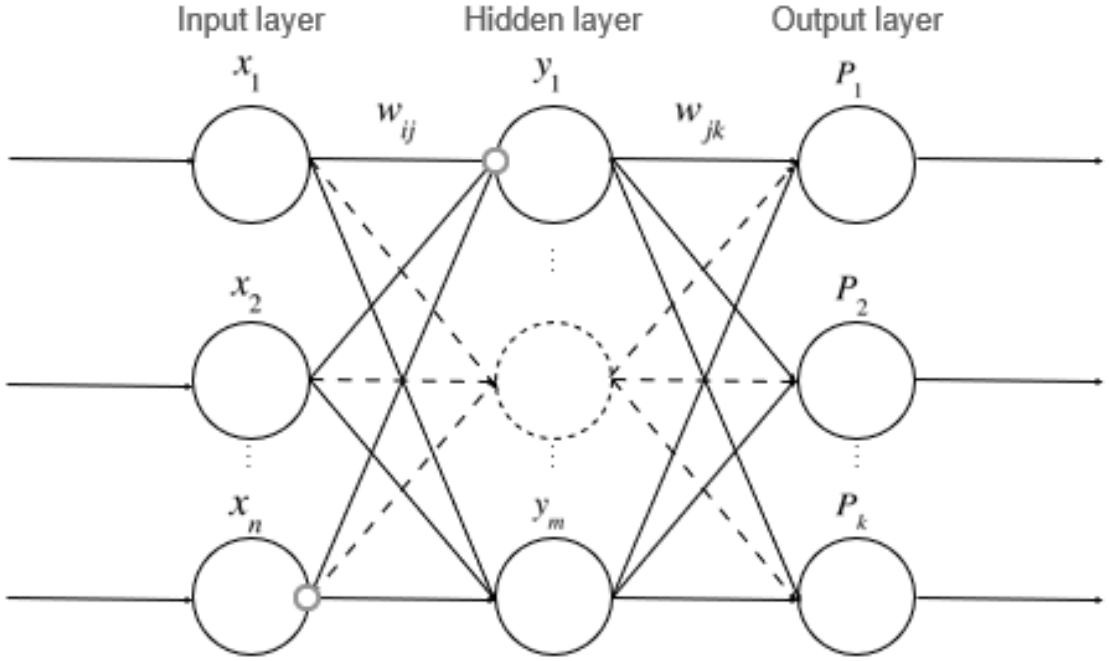
Brief summary

- Prediction module:
  - receives information from transmission module
  - delivers prediction to dispatching module
  - aims to guarantee data transmission

Prediction module

Methods

- BP neural network
  - Non-linear mapping, generalization ability, self-adaption
  - The structure of the BP neural network looks like:

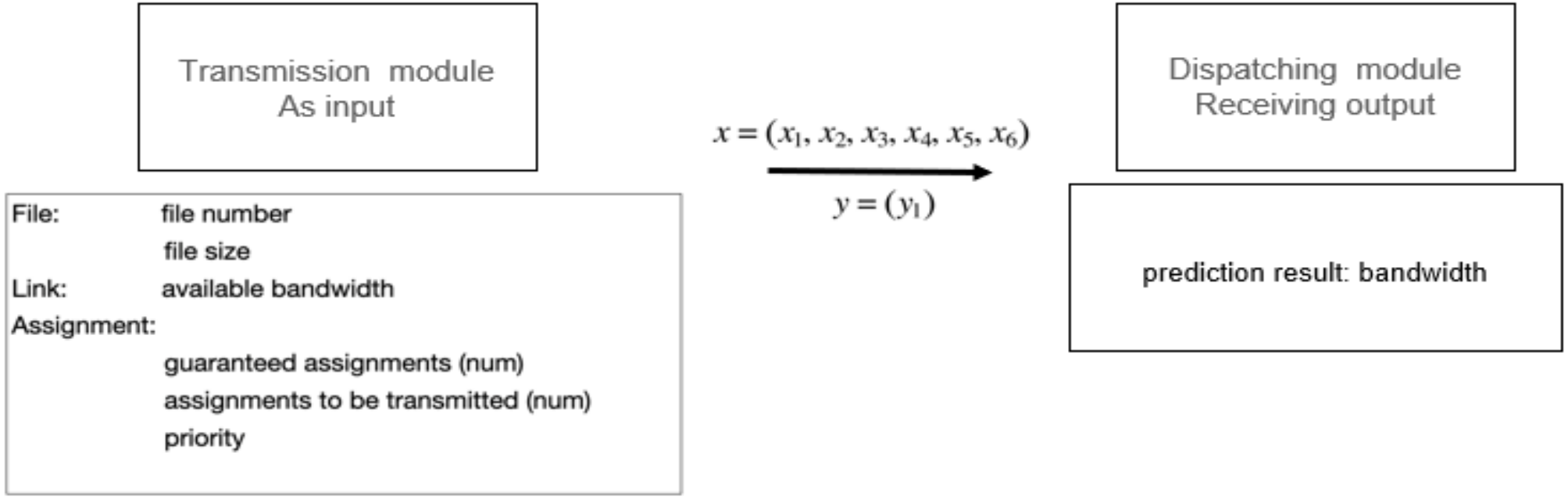


Prediction module

Input include priority

The priority of a certain assignment should be one of the parameters.

- Input : the number of input nodes $N_{in} = 6$
- Output : the number of output node $N_{out} = 1$



Future plan

- Discuss and improve the prediction module
- Meet the requirements of IHEPCC

Summary

- High energy physics experiment has two features: remote construction and sharing link.
- A method based on BP neural network is to used to estimate bandwidth need.
- The prediction results can be the guidance and suggestions for dispatching the resources.

Thank you!