[0032]

Additionally, the first feature acquisition unit 2-2G computes the scalar quantity "$|\Sigma r_G|$" of the vector sum "Σr_G" and the argument "$Arg(\Sigma r_G)$" of the vector sum "Σr_G" as the features.

[0033]

Also, the second feature acquisition unit 2-2S, on the basis of the transition data, acquires features related to the communication traffic volume on the communication channel Ch2. Specifically, the second feature acquisition unit 2-2S computes the vector sum of a feature vector r associated with the client ID of the silver-class client organization 8S. Note that in FIG. 2, the feature vector r associated with the client ID of the client organization 8S is designated "r_S", and the vector sum is designated "Σr_S". Additionally, the second feature acquisition unit 2-2S computes the scalar quantity "$|\Sigma r_S|$" of the vector sum "Σr_S" and the argument "$Arg(\Sigma r_S)$" of the vector sum "Σr_S" as the features.

[0034]

Also, the third feature acquisition unit 2-2B, on the basis of the transition data, acquires features related to the communication traffic volume on the communication channel Ch3. Specifically, the third feature acquisition unit 2-2B computes the vector sum of a feature vector r associated with the client ID of the bronze-class client organization 8B. Note that in FIG. 2, the feature vector r associated with the client ID of the client organization 8B is designated "r_B", and the vector sum is designated "Σr_B". Additionally, the third feature acquisition unit 2-2B computes the scalar quantity "$|\Sigma r_B|$" of the vector sum "Σr_B" and the argument "$Arg(\Sigma r_B)$" of the vector sum "Σr_B" as the features.

[0035]

[Determination unit]

Additionally, the communication management system 2, is equipped with a determination unit 2-3. The determination unit 2-3 determines, for each communication channel 6, whether or not the features acquired by the feature acquisition unit 2-2 for that communication channel 6 satisfy a condition unique to that communication channel. In the present exemplary embodiment, the determination unit 2-3 includes a first determination unit 2-3G, a second determination unit 2-3S, and a third determination unit 2-3B.

[0036]

The first determination unit 2-3G determines whether or not both the scalar quantity "$|\Sigma r_G|$" and the argument "$\mathrm{Arg}(\Sigma r_G)$" satisfy a condition unique to the communication channel Ch1. Specifically, the first determination unit 2-3G determines whether or not the scalar quantity "$|\Sigma r_G|$" is less than or equal to an upper-limit scalar quantity R_G unique to the communication channel Ch1, and also whether or not the argument "$\mathrm{Arg}(\Sigma r_G)$" is less than or equal to an upper-limit argument θ_G. In other words, the first determination unit 2-3G determines whether or not both of the following two inequalities hold true.

[0037]

$|\Sigma r_G| \leq R_G$ ... Inequality (1)

$\mathrm{Arg}(\Sigma r_G) \leq \theta_G$ ... Inequality (2)

[0038]

Also, the second determination unit 2-3S determines whether or not both the scalar quantity "$|\Sigma r_S|$" and the argument "$\mathrm{Arg}(\Sigma r_S)$" satisfy a condition unique to the communication channel Ch2. Specifically, the second determination unit 2-3S determines whether or not the scalar quantity "$|\Sigma r_S|$" is less than or equal to an upper-limit scalar quantity R_S unique to the communication channel Ch2, and also whether or not the argument "$\mathrm{Arg}(\Sigma r_S)$" is less than or equal to an upper-limit argument θ_S. In other words, the second determination unit 2-3S determines whether or not both of the following two inequalities hold true.

[0039]

$|\Sigma r_S| \leq R_S$ ... Inequality (3)

$\mathrm{Arg}(\Sigma r_S) \leq \theta_S$... Inequality (4)

[0040]

Also, the third determination unit 2-3B determines whether or not both the scalar quantity "$|\Sigma r_B|$" and the argument "$\mathrm{Arg}(\Sigma r_B)$" satisfy a condition unique to the communication channel Ch3. Specifically, the third determination unit 2-3B determines whether or not the scalar quantity "$|\Sigma r_B|$" is less than or equal to an upper-limit scalar quantity R_B unique to the communication channel Ch3, and also whether or not the argument "$\mathrm{Arg}(\Sigma r_B)$" is less than or equal to an upper-limit argument θ_B. In other words, the third determination unit 3-3B determines whether

channel 6, on the basis of a determination result of the determination unit 2-3. In the present exemplary embodiment, the configuration unit 2-4 includes a first configuration unit 2-4G, a second configuration unit 2-4S, and a third configuration unit 2-4B.

[0045]

The first configuration unit 2-4G configures the configuration value BW_G on the basis of a determination result of the first determination unit 2-3G. Herein, the first configuration unit 2-4G configures the configuration value BW_G to the above BW1 if the above Inequality (1) or Inequality (2) does not hold true, and configures the configuration value BW_G to a value between the above BW2 and the above BW1 if Inequality (1) and Inequality (2) both hold true. Also, the second configuration unit 2-4S configures the configuration value BW_S to the above BW2 if the above Inequality (3) or Inequality (4) does not hold true, and configures the configuration value BW_S to a value between the above B3 and the above B2 if Inequality (3) and Inequality (4) both hold true. Also, the third configuration unit 2-4B configures the configuration value BW_B to the above BW3 if the above Inequality (5) or Inequality (6) does not hold true, and configures the configuration value BW_B to a value between the above BW4 and the above BW3 if Inequality (5) and Inequality (6) both hold true.

[0046]

In this way, the configuration value BW of the bandwidth on each communication channel 6 is configured periodically. Since the configuration value BW of the bandwidth on each communication channel 6 is configured from features related to the communication traffic volume on each communication channel 6, the configuration values BW are optimized while ensuring the user quality of experience.

[0047]

[Communication unit, delivery database]

Note that the communication management system 2 is equipped with a communication unit 2-6 and a delivery database (hereinafter, delivery DB) 2-7.

[0048]

The communication unit 2-6 communicates with each terminal 10 via the communication channel 6 assigned to the client organization 8 to which that terminal 10 belongs. In other words, the communication unit 2-6 provides an information processing service to each terminal 10 via the communication channel 6 assigned to

stored in main memory by being read out from a computer-readable information storage medium such as a DVD (registered trademark)-ROM, or stored in main memory by being downloaded from a network.

[0069]

As another example, in the foregoing, the actual bandwidth acquisition unit 2-9 obtained the measured values $BW_{Gtraffic}$, $BW_{Straffic}$, and $BW_{Btraffic}$ by "receiving" from the terminal G, the terminal S, and the terminal B, but the actual bandwidth acquisition unit 2-9 itself may also measure the measured values $BW_{Gtraffic}$, $BW_{Straffic}$, and $BW_{Btraffic}$. In this case, to measure the measured values $BW_{Gtraffic}$, $BW_{Straffic}$, and $BW_{Btraffic}$, the actual bandwidth acquisition unit 2-9 may transmit a dummy packet to the terminal G, the terminal S, and the terminal B at a predetermined time interval, and compute the measured values $BW_{Gtraffic}$, $BW_{Straffic}$, and $BW_{Btraffic}$ from the results of acknowledgements returned from each terminal 10.

[0070]

As another example, in the foregoing, the update unit 2-12 updates the value of at least one of BW_G, BW_S, and BW_B only when the total $BW_{traffic}$ is smaller than the total BW_{SUM}, but the update unit 2-12 may also update the value of at least one of BW_G, BW_S, and BW_B even when the total $BW_{traffic}$ is larger than the total BW_{SUM}. For example, when the total $BW_{traffic}$ is larger than the total BW_{SUM}, the update unit 2-12 may raise the value of at least one of BW_G, BW_S, and BW_B.

[0071]

Specifically, if the total $BW_{traffic}$ is larger than the total BW_{SUM}, the update unit 2-12 computes a value δ that is one-third the difference Δ between the total BW_{SUM} and the total $BW_{traffic}$ ($\delta = \Delta / 3$), and raises the value of BW_G, BW_S, and BW_B by δ. As another example, if the total $BW_{traffic}$ is larger than the total BW_{SUM}, the update unit 2-12 raises each of BW_G, BW_S, and BW_B by a value depending on the type of communication channel 6. For example, the update unit 2-12 may compute a value $\delta 1$ that is one-sixth Δ ($\delta 1 = \Delta / 6$), and raise the value of BW_G by the triple of $\delta 1$, raise the value of BW_S by the double of $\delta 1$, and raise the value of BW_B by $\delta 1$. In this way, the values of BW_G, BW_S, and BW_B are raised so that the total $BW_{traffic}$ becomes less than or equal to BW_{SUM}. In addition, when the total $BW_{traffic}$ is larger than the total BW_{SUM}, the update unit 2-12 may also revert each of BW_G, BW_S, and BW_B to an initial value. Herein, the "initial value" refers to the value of each of BW_G, BW_S, and BW_B

configured by the configuration unit 2-4. In this case, the communication management system 2 may be additionally equipped with storage means that stores initial values configured by the configuration unit 2-4, and when the total $BW_{traffic}$ is larger than the total BW_{SUM}, the update unit 2-12 may read out the initial values.

[0072]

In addition, when the total $BW_{traffic}$ is larger than the total BW_{SUM}, the update unit 2-12 may raise the value of at least one of BW_G, BW_S, and BW_B according to a priority order BW_G, BW_S, and BW_B. In other words, when the total $BW_{traffic}$ is larger than the total BW_{SUM}, the update unit 2-12 prioritizes raising the value of the configuration value BW_G by the above Δ before raising BW_S and BW_B. However, if "$BW_G + \Delta$" exceeds the upper-bound value BW1, the update unit 2-12 prioritizes raising the configuration value BW_S by Δ before raising BW_B. Note that if "$BW_S + \Delta$" becomes less than or equal to the upper-bound value BW2, the update unit 2-12 raises the final remaining configuration value BW_B by Δ.

Reference Signs List

[0073]

1 cloud service system
2 communication management system
2-2 feature acquisition unit
2-2G first feature acquisition unit
2-2S second feature acquisition unit
2-2B third feature acquisition unit
2-3 determination unit
2-3G first determination unit
2-3S second determination unit
2-3B third determination unit
2-4 configuration unit
2-4G first configuration unit
2-4S second configuration unit
2-4B third configuration unit
2-5 bandwidth DB
2-6 communication unit

CLAIMS

[Claim 1]

A communication management system comprising:

communication means that respectively communicates with an information terminal belonging to one of a plurality of groups, via a communication channel assigned to the group to which the information terminal belongs, from among a plurality of communication channels;

control means that controls a communication via the communication channel on the basis of a configuration value of bandwidth on the communication channel;

bandwidth configuration means that, for each communication channel, configures the configuration value of bandwidth on the communication channel, on the basis of data indicating time transitions of communication traffic volume of the group to which the communication channel is assigned;

acquisition means that, after the configuration value of bandwidth on each communication channel is configured, repeatedly acquires a total of measured values of actual bandwidth on each communication channel;

comparison means that, every time the total is acquired, compares the acquired total to a total of the configuration values of bandwidth on each communication channel; and

update means that, on the basis of a comparison result of the comparison means, updates the configuration value of bandwidth on at least one communication channel such that the configuration value of bandwidth on each communication channel is continuously adjusted according to the total measured value of actual bandwidth on each communication channel and the configuration value of bandwidth on each communication channel is continuously optimized.

[Claim 2]

The communication management system according to Claim 1, further comprising:

feature acquisition means that, for each communication channel, acquires features related to the communication traffic volume on the communication channel, on the basis of data indicating time transitions of communication traffic volume of the

group to which the communication channel is assigned,

characterized in that, the bandwidth configuration means

for each communication channel, configures the configuration value of bandwidth on the communication channel on the basis of whether or not the features acquired for the communication channel satisfy a condition unique to the communication channel.

[Claim 3]

The communication management system according to Claim 1 or 2, wherein

when the total of the measured values of actual bandwidth on each communication channel is smaller than the total of the configuration values of bandwidth on each communication channel, the update means lowers the configuration value of bandwidth on at least one communication channel.

[Claim 4]

The communication management system according to Claim 3, wherein,

when the total of the measured values of actual bandwidth on each communication channel is smaller than the total of the configuration values of bandwidth on each communication channel, the update means lowers the configuration value of bandwidth on at least one communication channel, so that the total of the measured values of actual bandwidth on each communication channel does not become less than or equal to the total of the configuration values of bandwidth on each communication channel.

[Claim 5]

The communication management system according to Claim 3 or 4, wherein,

when the total of the measured values of actual bandwidth on each communication channel is smaller than the total of the configuration values of bandwidth on each communication channel, the update means prioritizes lowering the configuration value of bandwidth on a communication channel before lowering the configuration value of bandwidth on a communication channel with a larger configuration value than the communication channel.

[Claim 6]

A program causing a computer to function as:

communication means that respectively communicates with an information terminal belonging to one of a plurality of groups, via a communication channel assigned to the group to which the information terminal belongs, from among a plurality of communication channels;

control means that controls a communication via the communication channel on the basis of a configuration value of bandwidth on the communication channel;

bandwidth configuration means that, for each communication channel, configures the configuration value of bandwidth on the communication channel, on the basis of data indicating time transitions of communication traffic volume of the group to which the communication channel is assigned;

acquisition means that, after the configuration value of bandwidth on each communication channel is configured, repeatedly acquires a total of measured values of actual bandwidth on each communication channel;

comparison means that, every time the total is acquired, compares the acquired total to a total of the configuration values of bandwidth on each communication channel; and

update means that, on the basis of a comparison result of the comparison means, updates the configuration value of bandwidth on at least one communication channel such that the configuration value of bandwidth on each communication channel is continuously adjusted according to the total measured value of actual bandwidth on each communication channel and the configuration value of bandwidth on each communication channel is continuously optimized.