Transfer ownership node - SRG

Overview

Description and rationale

The Transfer of Ownership node is used to represent two different administrative arrangements:

1. The situation within an ownership system where the ownership of the passing water or orders is changed.
2. Where two ownership systems meet. The transfer of ownership node handles the passage of orders and water with respect to their ownership.

Scale

This operates at the point scale on a daily time step.

Principal developer

Originally developed by staff of the MDBA and NOW.

Scientific Provenance

Being an administrative arrangement the transfer of ownership node is based on existing policy.

Version

Available since 3.7.0.

Dependencies

The transfer of ownership requires an ownership system to have been defined.

Structure & processes

The main difference between using a transfer of ownership node as an in-system node or as a boundary between two ownership systems is that in the first instance all of the upstream owners will appear as downstream owners in the distribution tables, while in the latter the owners will only appear on one side of the matrix.

Ordering Phase

For the ordering phase, a look-up table of weights is used to transfer the orders of downstream owners to the upstream owners. The order of a downstream owner is split based on the ratio of the individual connection weight to the sum of all the connection weights emanating from the downstream owner.

If there are *m* owners upstream of the node and *n* owners downstream then the user will have to enter a *m* x *n* table of weights to determine how the downstream orders are divided among the upstream owners. For the transfer between a single downstream and upstream owner the order is split in proportion to the weight given to the connection as a fraction of the total of the weights from this downstream owner (Equation 1).

Equation 1	? Unknown Attachment

Where:

$USOrder_{ij}$ is the order for upstream owner *i* from downstream owner *j*.

$DSOrder_{j}$ is downstream owner *j*'s current order.

$Weight_{ij}$ is the user specified weighting factor for orders being transferred from owner *j* to owner *i*.

> **Note:** If the sum of $Weight_{kj}$ is zero for a downstream owner then Source will not pass any orders upstream for owner *j*.

For an upstream owner the total order will be the sum of all the shares of orders passed to them from the downstream owners (Equation 2).

Equation 2	? Unknown Attachment

Where*:*

$USOrder_{i}$ is the order for upstream owner *i*.

Flow Phase

Within an ownership system

When a transfer of ownership node has the same ownership system both up and downstream then the user specifies a table of target transfer rates between owners. If there are *n* owners upstream of the node there will be *n* owners downstream then the user will have to enter a *n* x *n* table of target transfer rates, which can be optionally specified as functions.

The maximum transfer that can be made from an upstream owner is limited to their share of the upstream flow (Equation 3)

Equation 3	? Unknown Attachment

Where:

$AllowedTransfer_{i}$ is the rate of transfer permitted from upstream owner *i*.

$Transfer_{ij}$ is the user specified transfer rate from upstream owner *i* to downstream owner *j* (or the result of evaluating the user specified function)

$USFlow_i$ is the upstream flow rate of owner *i*.

The actual flow rate transferred from one owner (Provided that their allowed transfer is greater than zero) to another is shown in Equation 4.

Equation 4	? Unknown Attachment

Where:

$TransferredFlow_{ij}$ is the flow rate of ownership transferred from upstream owner *i* to downstream owner *j*.

The downstream ownership of an owner will be their upstream ownership flow rate minus the transfer from them plus transfers made to them (Equation 5)

Equation 5	? Unknown Attachment

Where:

$DSFlow_i$ is the flow for downstream owner *i.*

Noting that $TransferredFlow_{ii}$ is zero.

On the boundary between ownership systems

If there are *m* owners upstream of the node and *n* owners downstream then the *m* x *n* table of weights referenced above in the ordering pahse, is used to determine how the upstream flows are divided among the downstream owners. The share of the upstream flow of an owner to a downstream owner is shown in Equation 6.

Equation 6	? Unknown Attachment

Where*:*

$DSFlow_{ji}$ is the flow for downstream owner *j* from upstream owner *i*.

$USFlow_i$ is the flow of upstream owner *i*.

$Weight_{ij}$ is the user specified weighting factor for flows being transferred from upstream owner *i* to downstream owner *j*.

> If the sum of $Weight_{ik}$ is zero for an upstream owner then Source will split their flow equally among the downstream owners.

For a downstream owner the total flow will be the sum of all the shares of flows passed to them from the upstream owners (Equation 7).

Equation 7	? Unknown Attachment

Where:

$DSFlow_j$ is the flow for downstream owner *j.*

Data

Parameters or settings

Parameter	Description	Units	Default	Range
Weight$_{ij}$ (Orders)	Weight to be applied when calculating how much of a downstream owners order to transfer to an upstream owner.	Unit less	One-to-one for each owner (ie: diagonal 100%, off-diagonal 0%)	Any value greater than or equal to zero
Weight$_{ij}$ (Flows)	Weight to be applied when calculating how much of an upstream owners flow to transfer to a downstream owner when the transfer node is acting a boundary between ownership systems.	Unit less	One-to-one for each owner (ie: diagonal 100%, off-diagonal 0%)	Any value greater than or equal to zero
Transfer$_{ij}$	Desired rate of transfer of ownership from one owner to another when the transfer node is within a single ownership system.	L^3T^{-1}	No applicable default	Any value greater than or equal to zero