Algorithm 1 New RibEntry *entry* with New FaceEntry $face$

```
1: Add entry to RIB
2: Add face to entry
3: Create FIB update to add face to entry.name in FIB
4: if face.CHILD_INHERIT == false and face.CAPTURE == false then
5:    Create ancestor_face_list
6:    for each ancestor_face in ancestor_face_list do
7:       if ancestor_face is not in entry.face_list then
8:          Create FIB update to add ancestor_face to entry.name in FIB
9:       end if
10:   end for
11: else if face.CHILD_INHERIT == true and face.CAPTURE == true then
12:   Create ancestor_face_list
13:   for each child in entry.children do
14:      for each ancestor_face in ancestor_face_list do
15:         if child.CAPTURE == true then
16:            ignore child and subtree
17:         end if
18:         if ancestor_face is in child.face_list and child.face.CHILD_INHERIT then
19:            Do not remove ancestor_face from child or subtree
20:         else if ancestor_face is not in child.face_list then
21:            create FIB update to remove ancestor_face from child.name in FIB
22:         end if
23:         if face is in child.face_list and child.face.CHILD_INHERIT then
24:            Ignore child and child.subtree
25:         else if face is not in child.face_list then
26:            create FIB update to add face to child.name in FIB
27:         end if
28:      end for
29:   end for
30: else if face.CHILD_INHERIT == true then
31:   Create ancestor_face_list
32:   for each ancestor_face in ancestor_face_list do
33:      create FIB update to add ancestor_face to entry.name in FIB
34:   end for
35:   if ancestor_face_list has a face with same ID as face.faceId then
36:      replace with face
37:   end if
38:   for each child in entry.children do
39:      for each ancestor_face in ancestor_face_list do
40:         if child.CAPTURE == true then
41:            ignore child and subtree
42:         end if
43:         if ancestor_face is in child.face_list and child.face.CHILD_INHERIT then
44:            Do not add ancestor_face to child or subtree
45:         else if ancestor_face is not in child.face_list then
46:            create FIB update to add ancestor_face to child.name in FIB
47:         end if
48:      end for
49:   end for
50: else if face.CAPTURE == true then
51:   Create ancestor_face_list
52:   for each ancestor_face in ancestor_face_list do
53:      for each child in entry.children do
54:         if child.CAPTURE == true then
55:            ignore child and subtree
56:         end if
57:         if ancestor_face is in child.face_list and child.face.CHILD_INHERIT then
58:            remove ancestor_face from ancestor_face_list
59:         else if ancestor_face is not in child.face_list then
60:            create FIB update to remove ancestor_face from child.name in FIB
61:         end if
62:      end for
63:   end for
64: end if
```

Algorithm 2 Add New FaceEntry $face$ to Existing RibEntry *entry*

```
1: Add face to RIB entry
2: if face has a lower cost than any other face in entry.face_list with the same face ID then
3:     Create FIB update to add face to entry.name in FIB
4: end if
5: ancestor_face_list = empty list
6: if entry.capture became true then
7:     Create ancestor_face_list
8:     for each ancestor_face in ancestor_face_list do
9:         if ancestor_face is not in entry.face_list then
10:            Create FIB update to remove ancestor_face from entry.name in FIB
11:        end if
12:    end for
13: end if
14: for each child in entry.children do
15:    for each ancestor_face in ancestor_face_list do
16:        if child.CAPTURE == true then
17:            ignore child and subtree
18:        end if
19:        if ancestor_face is in child.face_list and child.face.CHILD_INHERIT then
20:            Do not apply to child and subtree
21:        else if ancestor_face is not in child.face_list then
22:            create FIB update to remove ancestor_face from child.name in FIB
23:        end if
24:    end for
25:    if face.CHILD_INHERIT == true and face is lower cost than any other face in
       entry.face_list with the same face ID and CHILD_INHERIT set then
26:        if face is in child.face_list and child.face.CHILD_INHERIT then
27:            Do not add face to child or subtree
28:        else if face is not in child.face_list then
29:            create FIB update to add face to child.name in FIB
30:        end if
31:    end if
32: end for
```

Algorithm 3 Update Existing FaceEntry *face* in Existing RibEntry *entry*

```
Updating entry in RIB
if face.cost did not change and face.flags did not change then
    return
end if
if face.cost is different from previous cost then
    if face has a lower cost than any other face in entry.face_list with the same face ID then
        create FIB update to update face.cost in entry.name in FIB
    else if face is no longer the lowest cost entry with face.faceId then
        create FIB update to update face.cost in entry.name in FIB to new lowest cost
    end if
    if face.flags did not change and face.CHILD_INHERIT == true then
        for each child in entry.children do
            if child.CAPTURE == true then
                ignore child and subtree
            end if
            if face is lower cost than any other face in entry.face_list with the same face ID and CHILD_INHERIT set then
                if face is in child.face_list and child.face.CHILD_INHERIT then
                    ignore child and subtree
                else if face is not in child.face_list then
                    create FIB update to update face.cost in child.name in FIB
                end if
            end if
        end for
    end if
end if
if turn on CHILD_INHERIT flag then
    for each child in entry.children do
        if child.CAPTURE == true then
            ignore child and child.children
        else if entry.face is in child.face_list then
            ignore child
        else if entry.face is in child.face_list and child.face.CHILD_INHERIT then
            ignore child and child.children
        else if face is lower cost than any other face in entry.face_list with the same face ID and CHILD_INHERIT set then
            create FIB update to add entry.face to child.name in FIB
        end if
    end for
else if turn off CHILD_INHERIT flag then
    if another face in entry.face_list has same face ID and CHILD_INHERIT set then
        ancestor_face = face in entry.face_list with same face ID, CHILD_INHERIT set, and lowest cost
    else
        ancestor_face = ancestor with face.faceId and CHILD_INHERIT
    end if
    for each child in entry.children do
        if child.CAPTURE == true then
            ignore child and child.children
        else if entry.face is in child.face_list then
            ignore child
        else if entry.face is in child.face_list and child.face.CHILD_INHERIT then
            ignore child and child.children
        else
            create FIB update to remove entry.face from child.name in FIB
            create FIB update to add ancestor_face to child.name in FIB
        end if
    end for
end if
```

Algorithm 4 Update Existing FaceEntry $face$ in Existing RibEntry *entry* (continued)

```
1: if turn on CAPTURE flag then
2:     create ancestor_face_list
3:     for each ancestor_face in ancestor_face_list do
4:         if ancestor_face is in entry.face_list then
5:             continue
6:         else
7:             create FIB update to remove ancestor_face from entry.name in FIB
8:         end if
9:     end for
10:    for each child in entry.children do
11:        for each ancestor_face in ancestor_face_list do
12:            if ancestor_face is in child.face_list and face.CHILD_INHERIT then
13:                Do not remove ancestor_face from child or subtree
14:            else if face is not in child.face_list then
15:                create FIB update to remove face from child.name in FIB
16:            end if
17:        end for
18:    end for
19: else if turn off CAPTURE flag then
20:    create ancestor_face_list
21:    for each ancestor_face in ancestor_face_list do
22:        if ancestor_face is in entry.face_list then
23:            continue
24:        else
25:            create FIB update to add ancestor_face to entry.name in FIB
26:        end if
27:    end for
28:    for each child in entry.children do
29:        for each ancestor_face in ancestor_face_list do
30:            if ancestor_face is in child.face_list and face.CHILD_INHERIT then
31:                Do not add ancestor_face to child or subtree
32:            else if ancestor_face is not in child.face_list then
33:                create FIB update to add ancestor_face to child.name in FIB
34:            end if
35:        end for
36:    end for
37: end if
```

Algorithm 5 Remove FaceEntry $face$ from RibEntry *entry*

```
1: Remove face from RIB entry
2: Create FIB update to remove face from entry.name in FIB
3: ancestor_face_list = empty list
4: if face.CHILD_INHERIT and face.CAPTURE then
5:     if entry.capture was turned off then
6:         Create ancestor_face_list
7:     end if
8:     for each child in entry.children do
9:         if child.CAPTURE == true then
10:            ignore child and subtree
11:        end if
12:        if face is in child.face_list and child.face.CHILD_INHERIT then
13:            Ignore child and child.subtree
14:        else if face is not in child.face_list then
15:            create FIB update to remove face from child.name in FIB
16:        end if
17:        for each ancestor_face in ancestor_face_list do
18:            if child.CAPTURE == true then
19:                ignore child and subtree
20:            end if
21:            if ancestor_face is in entry.face_list and entry.face.CHILD_INHERIT then
22:                remove ancestor_face from ancestor_face_list
23:            else if face is not in entry.face_list then
24:                create FIB update to add ancestor_face to entry.name in FIB
25:            end if
26:            if ancestor_face is in child.face_list and child.face.CHILD_INHERIT then
27:                remove ancestor_face from ancestor_face_list
28:            else if ancestor_face is not in child.face_list then
29:                create FIB update to add ancestor_face to child.name in FIB
30:            end if
31:        end for
32:    end for
33: else if face.CHILD_INHERIT then
34:    if entry.capture == false then
35:        Create ancestor_face_list
36:    end if
37:    for each child in entry.children do
38:        if child.CAPTURE == true then
39:            ignore child and subtree
40:        end if
41:        if face is in child.face_list and child.face.CHILD_INHERIT then
42:            Ignore child and child.subtree
43:        else if face is not in child.face_list then
44:            create FIB update to remove face from child.name in FIB
45:        end if
46:        if entry.capture == false then
47:            for each ancestor_face in ancestor_face_list do
48:                if ancestor_face is in child.face_list and child.face.CHILD_INHERIT
                   then
49:                    continue
50:                else if ancestor_face is not in child.face_list then
51:                    create FIB update to add ancestor_face to child.name in FIB
52:                end if
53:            end for
54:        end if
55:    end for
56: end if
```

Algorithm 6 Remove FaceEntry $face$ from RibEntry $entry$ (continued)

```
1: if face.CAPTURE then
2:     if entry.capture was turned off then
3:         Create ancestor_face_list
4:     end if
5:     for each ancestor_face in ancestor_face_list do
6:         if entry.capture was turned off then
7:             if ancestor_face is in entry.face_list and entry.face.CHILD_INHERIT then
8:                 ignore
9:             else if face is not in entry.face_list then
10:                create FIB update to add ancestor_face to entry.name in FIB
11:            end if
12:        end if
13:    end for
14:    for each child in entry.children do
15:        if child.CAPTURE == true then
16:            ignore child and subtree
17:        end if
18:        for each ancestor_face in ancestor_face_list do
19:            if ancestor_face is in child.face_list and child.face.CHILD_INHERIT then
20:                Do not add ancestor_face to child or subtree
21:            else if ancestor_face is not in child.face_list then
22:                create FIB update to add ancestor_face to child.name in FIB
23:            end if
24:        end for
25:    end for
26: end if
27: if face was blocking an inherited face then
28:    create FIB update to add blocked_face to entry.name in FIB
29: end if
```

Algorithm 7 Create Ancestor Face List

```
1: To create ancestor_face_list given a RibEntry entry:
2: Create list ancestor_face_list
3: parent = entry.parent
4: while parent != NULL do
5:     for each face in parent.face_list do
6:         if face.CHILD_INHERIT == true then
7:             Add face to ancestor_face_list
8:         end if
9:     end for
10:    if parent.CAPTURE == true then
11:        break
12:    end if
13:    parent = parent.parent
14: end while
15: return ancestor_face_list
```