APPENDIX

Algorithm 6: Depth-first Search (DFS) on Reachability Trees

Input: A PN N, M_0, M_d, and a NIS X
Output: The existence of LFSs corresponding to X

Function $DFS(N, M_0, M_d, X)$
  $x=\sum X(i)$, where $i\in\mathbf{N}_n^+$;
  Put M_0 on stack S, $M_0.l=0$, and $M_0.t=0$, where $M_0.l$ is the number of layer of M_0;
  while $S\neq\varnothing$, **then**
    Let the marking at the top of S be M_p, where M_p is a parent marking;
    if $M_p.l==x$, **then**
      M_p is removed from S, **continue**;
      $X(k)=X(k)+1$, where $M_p.t=k$;
    else if $M_p.l\neq x$, **then**
      $i=n$ and M_p is removed from S;
      while $i\neq 0$
        if $M_p[t_i\rangle M_c$ and $X(i)>0$ **then**
          if $M_c==M_d$, **then**
            There are LFSs corresponding to X, and **return**;
          else
            $X(i)=X(i)-1$;
            Add M_c to S, $M_c.l=x+1$, $M_c.t=i$;
          end
        end
        $i=i-1$;
      end
    end
  end
  if $S==\varnothing$, **then**
    There is no LFS corresponding to X, and **return**;
  end
  return;
end

Algorithm 7: Breadth-first Search (BFS) on Reachability Trees

Input: A PN N, M_0, M_d, and a NIS X
Output: The existence of LFSs corresponding to X

Function $BFS(N, M_0, M_d, X)$
  $x=\sum X(i)$, where $i\in\mathbf{N}_n^+$;
  Put M_0 on queue Q and $M_0.l$: $=0$, where $M_0.l$ is the number of layer of M_0;
  $i=1$;
  while $i<=$length(Q), where length(Q) is the length of Q, **then**
    if $M_p.l==x$, **then**
      There is no LFS corresponding to X, and **return**;
    else if $M_p.l\neq x$, **then**
      $j=1$;
      while $j<=n$
        if $M_p[t_j\rangle M_c$ and $X(j)>0$, **then**
          if $M_c==M_d$, **then**
            There are LFSs corresponding to X, and **return**;
          else
            $X(j)=X(j)-1$;
            Add M_c to Q, $M_c.l=x+1$;
          end
        end
        $j=j+1$;
      end
    end
    $i=i+1$;
  end
  if $i>$length(Q), **then**
    There is no LFS corresponding to X, and **return**;
  end
  return;
end