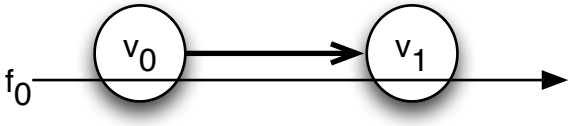
Tandem_1SC_1Flow



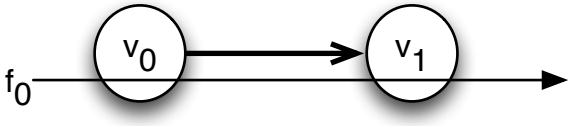
- $\beta_{v_0} = \beta_{v_1} = \beta_{R_{v_i},T_{v_i}} = \beta_{10,10}$, $i \in \{0,1\}$
- $\alpha^{f_0} = \gamma_{r^{f_0},b^{f_0}} = \gamma_{5,25}$

TFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0} = \alpha^{f_0}$		$= \gamma_{5,25}$	
	$D_{v_0}^{f_0}$		$\beta_{v_0} = b_{v_0}$ $10 \cdot [t-10]^+ = 25$ $t = 12\frac{1}{2}$	FIFO per mico flow $\beta_{v_0} = b_{v_0}$ $10 \cdot [t-10]^+ = 25$ $t = 12\frac{1}{2}$
	$B_{v_0}^{f_0}$		$\alpha_{v_0}(T_{v_0}) = 5 \cdot 10 + 25$ $= 75$	
v_0v_1	$\alpha_{v_0v_1} = (\alpha_{v_0})^*$	$r_{v_0v_1}$	$= r_{v_0} = r^{f_0} = 5$	
		$b_{v_0v_1}$	$\alpha_{v_0}(T_{v_0}) = 75$	
		$=$	$= \gamma_{5,75}$	
v_1	$\alpha_{v_1} = \alpha_{v_0v_1}$		$= \gamma_{5,75}$	
	$D_{v_1}^{f_0}$		$\beta_{v_1} = b_{v_1}$ $10 \cdot [t-10]^+ = 75$ $t = 17\frac{1}{2}$	FIFO per micro flow $\beta_{v_1} = b_{v_1}$ $10 \cdot [t-10]^+ = 75$ $t = 17\frac{1}{2}$
	$B_{v_1}^{f_0}$		$\alpha_{v_1}(T_{v_1}) = 5 \cdot 10 + 75$ $= 125$	
D^{f_0}			$\sum_{i=0}^{1} D_{v_i}^{f_0} = 30$	
B^{f_0}			$\max_{i=\{0,1\}} b_{v_i}^{f_0} = 125$	

SFA		FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0}^{xf_0}$	$= \gamma_{0,0}$	
	$\beta_{v_0}^{\text{l.o.}f_0} = [\beta_{v_0} - \alpha_{v_0}^{xf_0}]^+ = \beta_{v_0}$	$= \beta_{10,10}$	
v_0v_1	$\alpha_{v_0v_1}^{xf_0}$	$= \gamma_{0,0}$	
v_1	$\alpha_{v_1}^{xf_0} = \alpha_{v_0v_1}^{xf_0}$	$= \gamma_{0,0}$	
	$\beta_{v_1}^{\text{l.o.}f_0} = [\beta_{v_1} - \alpha_{v_1}^{xf_0}]^+ = \beta_{v_1}$	$= \beta_{10,10}$	
$\beta_{\text{e2e}}^{\text{l.o.}f_0} = \beta_{R_{\text{e2e}}^{\text{l.o.}f_0}, T_{\text{e2e}}^{\text{l.o.}f_0}}$		$\bigotimes_{i=0}^{1} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{10,20}$	
D^{f_0}		$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $10 \cdot [t-20]^+ = 25$ $t = 22\frac{1}{2}$	
B^{f_0}		$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 5 \cdot 20 + 25$ $= 125$	

PMOO		ARB_MUX
e2e	$\beta_{\text{e2e}}^{f_0}$	$\bigotimes_{i=0}^{1} \beta_{v_i} = \beta_{10,20}$
	$\alpha_{\text{e2e}}^{xf_0}$	$= \gamma_{0,0}$
	$\beta_{\text{e2e}}^{\text{l.o.}f_0} = [\beta_{\text{e2e}}^{f_0} - \alpha_{\text{e2e}}^{xf_0}]^+ = \beta_{\text{e2e}}^{f_0}$	$= \beta_{10,20}$
D^{f_0}		$\begin{aligned} \beta_{\text{e2e}}^{\text{l.o.}f_0} &= b^{f_0} \\ 10 \cdot [t-20]^+ &= 25 \\ t &= 22\frac{1}{2} \end{aligned}$
B^{f_0}		$\begin{aligned} \alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) &= 5 \cdot 20 + 25 \\ &= 125 \end{aligned}$

Tandem_2SCs_1Flow



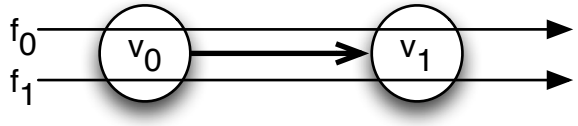
- $\beta_{v_0} = \beta_{R_{v_0},T_{v_0}} = \beta_{10,10}$
- $\beta_{v_1} = \beta_{R_{v_1},T_{v_1}} = \beta_{6,6}$
- $\alpha^{f_0} = \gamma_{r^{f_0},b^{f_0}} = \gamma_{5,25}$

TFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0} = \alpha^{f_0}$		$= \gamma_{5,25}$	
	$D_{v_0}^{f_0}$		$\beta_{v_0} = b_{v_0}$ $10 \cdot [t-10]^+ = 25$ $t = 12\frac{1}{2}$	FIFO per micro flow $\beta_{v_0} = b_{v_0}$ $10 \cdot [t-10]^+ = 25$ $t = 12\frac{1}{2}$
	$B_{v_0}^{f_0}$		$\alpha_{v_0}(T_{v_0}) = 5 \cdot 10 + 25$ $= 75$	
v_0v_1	$\alpha_{v_0v_1} = (\alpha_{v_0})^*$	$r_{v_0v_1}$	$= r_{v_0} = r^{f_0} = 5$	
		$b_{v_0v_1}$	$\alpha_{v_0}(T_{v_0}) = 75$	
		$=$	$= \gamma_{5,75}$	
v_1	$\alpha_{v_1} = \alpha_{v_0v_1}$		$= \gamma_{5,75}$	
	$D_{v_1}^{f_0}$		$\beta_{v_1} = b_{v_1}$ $6 \cdot [t-6]^+ = 75$ $t = 18\frac{1}{2}$	FIFO per micro flow $\beta_{v_1} = b_{v_1}$ $6 \cdot [t-6]^+ = 75$ $t = 18\frac{1}{2}$
	$B_{v_1}^{f_0}$		$\alpha_{v_1}(T_{v_1}) = 5 \cdot 6 + 75$ $= 105$	
D^{f_0}			$\sum_{i=0}^{1} D_{v_i}^{f_0} = 31$	
B^{f_0}			$\max_{i=\{0,1\}} b_{v_i}^{f_0} = 105$	

SFA		FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0}^{xf_0}$	$= \gamma_{0,0}$	
	$\beta_{v_0}^{\text{l.o.}f_0} = [\beta_{v_0} - \alpha_{v_0}^{xf_0}]^+ = \beta_{v_0}$	$= \beta_{10,10}$	
v_0v_1	$\alpha_{v_0v_1}^{xf_0}$	$= \gamma_{0,0}$	
v_1	$\alpha_{v_1}^{xf_0} = \alpha_{v_0v_1}^{xf_0}$	$= \gamma_{0,0}$	
	$\beta_{v_1}^{\text{l.o.}f_0} = [\beta_{v_1} - \alpha_{v_1}^{xf_0}]^+ = \beta_{v_1}$	$= \beta_{6,6}$	
$\beta_{\text{e2e}}^{\text{l.o.}f_0} = \beta_{R_{\text{e2e}}^{\text{l.o.}f_0}, T_{\text{e2e}}^{\text{l.o.}f_0}}$		$\bigotimes_{i=0}^{1} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{6,16}$	
D^{f_0}		$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $6 \cdot [t-16]^+ = 25$ $t = 20\frac{1}{6}$	
B^{f_0}		$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 5 \cdot 16 + 25$ $= 105$	

PMOO		ARB_MUX
e2e	$\beta_{\text{e2e}}^{f_0}$	$\bigotimes_{i=0}^{1} \beta_{v_i} = \beta_{6,16}$
	$\alpha_{\text{e2e}}^{xf_0}$	$= \gamma_{0,0}$
	$\beta_{\text{e2e}}^{\text{l.o.}f_0} = [\beta_{\text{e2e}}^{f_0} - \alpha_{\text{e2e}}^{xf_0}]^+ = \beta_{\text{e2e}}^{f_0}$	$= \beta_{6,16}$
D^{f_0}		$\begin{aligned} \beta_{\text{e2e}}^{\text{l.o.}f_0} &= b^{f_0} \\ 6 \cdot [t-16]^+ &= 25 \\ t &= 20\frac{1}{6} \end{aligned}$
B^{f_0}		$\begin{aligned} \alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) &= 5 \cdot 16 + 25 \\ &= 105 \end{aligned}$

Tandem_1SC_2Flows_1AC_1Path



- $\beta_{v_0} = \beta_{v_1} = \beta_{R_{v_i},T_{v_i}} = \beta_{10,10}$, $i \in \{0,1\}$
- $\alpha^{f_0} = \alpha^{f_1} = \gamma_{r^{f_j},b^{f_j}} = \gamma_{5,25}$, $j \in \{0,1\}$

Flows f_0, f_1

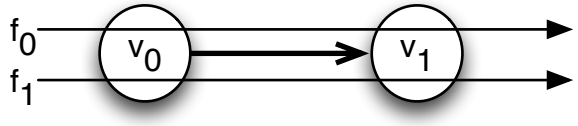
TFA results will be equal for all flows as they share the same path of servers.
SFA, PMOO results will be equal for all flows as they share the same path of servers and the same arrival curves.

TFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0} = \alpha^{f_0} + \alpha^{f_1}$		$= \gamma_{10,50}$	
	$D_{v_0}^{f_0}$		$\beta_{v_0} = b_{v_0}$ $10 \cdot [t-10]^+ = 50$ $t = 15$	$\beta_{v_0} = \alpha_{v_0}$ $10 \cdot [t-10]^+ = 10 \cdot t + 50$ $0 \cdot t = 150$ $\Rightarrow D_{v_0}^{f_0} = \infty$
	$B_{v_0}^{f_0}$		$\alpha_{v_0}(T_{v_0}) = 10 \cdot 10 + 50$ $= 150$	
v_0v_1	$\alpha_{v_0v_1} = (\alpha_{v_0})^*$	$r_{v_0v_1}$	$= 10$	
		$b_{v_0v_1}$	$\alpha_{v_0}(T_{v_0}) = 150$	
		$=$	$= \gamma_{10,150}$	
v_1	$\alpha_{v_1} = \alpha_{v_0v_1}$		$= \gamma_{10,150}$	
	$D_{v_1}^{f_0}$		$\beta_{v_1} = b_{v_1}$ $10 \cdot [t-10]^+ = 150$ $t = 25$	$\beta_{v_1} = \alpha_{v_1}$ $10 \cdot [t-10]^+ = 10 \cdot t + 150$ $0 \cdot t = 250$ $\Rightarrow D_{v_1}^{f_0} = \infty$
	$B_{v_1}^{f_0}$		$\alpha_{v_1}(T_{v_1}) = 10 \cdot 10 + 150$ $= 250$	
D^{f_0}			$\sum_{i=0}^{1} D_{v_i}^{f_0} = 40$	$\sum_{i=0}^{1} D_{v_i}^{f_0} = \infty$
B^{f_0}			$\max_{i=\{0,1\}} b_{v_i}^{f_0} = 250$	

SFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0}^{xf_0} = \alpha^{f_1}$		$= \gamma_{5,25}$	
	$\beta_{v_0}^{\text{l.o.}f_0} = [\beta_{v_0} - \alpha_{v_0}^{xf_0}]^+$	$R_{v_0}^{\text{l.o.}f_0}$	$= 5$	
		$T_{v_0}^{\text{l.o.}f_0}$	$\beta_{v_0} = b_{v_0}^{xf_0}$ $10 \cdot [t-10]^+ = 25$ $t = 12\frac{1}{2}$	$\beta_{v_0} = \alpha_{v_0}^{xf_0}$ $10 \cdot [t-10]^+ = 5 \cdot t + 25$ $t = 25$
		$=$	$= \beta_{5,12\frac{1}{2}}$	$= \beta_{5,25}$
v_0v_1	$\alpha_{v_0v_1}^{xf_0}$	$r_{v_0v_1}^{xf_0}$	$r_{v_0}^{f_1} = r^{f_1} = 5$	
		$b_{v_0v_1}^{xf_0}$	$\alpha_{v_0}^{xf_0}(T_{v_0}) = 5 \cdot 10 + 25$ $= 75$	
		$=$	$= \gamma_{5,75}$	
v_1	$\alpha_{v_1}^{xf_0} = \alpha_{v_0v_1}^{xf_0}$		$= \gamma_{5,75}$	
	$\beta_{v_1}^{\text{l.o.}f_0} = [\beta_{v_1} - \alpha_{v_1}^{xf_0}]^+$	$R_{v_1}^{\text{l.o.}f_0}$	$= 5$	
		$T_{v_1}^{\text{l.o.}f_0}$	$\beta_{v_1} = b_{v_1}^{xf_0}$ $10 \cdot [t-10]^+ = 75$ $t = 17\frac{1}{2}$	$\beta_{v_1} = \alpha_{v_1}^{xf_0}$ $10 \cdot [t-10]^+ = 5 \cdot t + 75$ $t = 35$
		$=$	$= \beta_{5,17\frac{1}{2}}$	$= \beta_{5,35}$
$\beta_{\text{e2e}}^{\text{l.o.}f_0} = \beta_{R_{\text{e2e}}^{\text{l.o.}f_0}, T_{\text{e2e}}^{\text{l.o.}f_0}}$			$\bigotimes_{i=0}^{1} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{5,30}$	$\bigotimes_{i=0}^{1} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{5,60}$
D^{f_0}			$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $5 \cdot [t-30]^+ = 25$ $t = 35$	$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $5 \cdot [t-60]^+ = 25$ $t = 65$
B^{f_0}			$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 5 \cdot 30 + 25$ $= 175$	$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 5 \cdot 60 + 25$ $= 325$

<table>
<tr><th colspan="3">PMOO</th><th>ARB_MUX</th></tr>
<tr><td rowspan="5">e2e</td><td colspan="2">$\beta_{\text{e2e}}^{f_0}$</td><td>$\bigotimes_{i=0}^{1} \beta_{v_i} = \beta_{10,20}$</td></tr>
<tr><td colspan="2">$\alpha_{\text{e2e}}^{xf_0} = \alpha^{f_1}$</td><td>$= \gamma_{5,25}$</td></tr>
<tr><td rowspan="3">$\beta_{\text{e2e}}^{\text{l.o.}f_0} = [\beta_{\text{e2e}}^{f_0} - \alpha_{\text{e2e}}^{xf_0}]^+$</td><td>$R_{\text{e2e}}^{\text{l.o.}f_0}$</td><td>$= 5$</td></tr>
<tr><td>$T_{\text{e2e}}^{\text{l.o.}f_0}$</td><td>$\begin{aligned}\beta_{\text{e2e}}^{f_0} &= \alpha_{\text{e2e}}^{xf_0}\\ 10 \cdot [t-20]^+ &= 5 \cdot t + 25\\ t &= 45\end{aligned}$</td></tr>
<tr><td>$=$</td><td>$= \beta_{5,45}$</td></tr>
<tr><td colspan="2">D^{f_0}</td><td>$\begin{aligned}\beta_{\text{e2e}}^{\text{l.o.}f_0} &= b^{f_0}\\ 5 \cdot [t-45]^+ &= 25\\ t &= 50\end{aligned}$</td></tr>
<tr><td colspan="2">B^{f_0}</td><td>$\begin{aligned}\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) &= 5 \cdot 45 + 25\\ &= 250\end{aligned}$</td></tr>
</table>

Tandem_2SCs_2Flows_1AC_1Path



- $\beta_{v_0} = \beta_{R_{v_0},T_{v_0}} = \beta_{10,10}$
- $\beta_{v_1} = \beta_{R_{v_1},T_{v_1}} = \beta_{6,6}$
- $\alpha^{f_0} = \alpha^{f_1} = \gamma_{r^{f_j},b^{f_j}} = \gamma_{2\frac{1}{2},12\frac{1}{2}}$, $j \in \{0,1\}$

Flows f_0, f_1

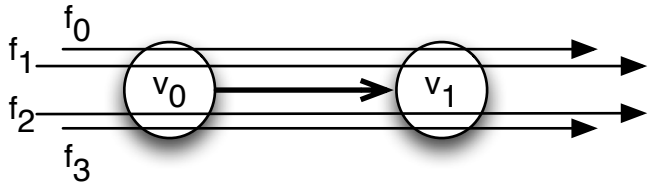
TFA results will be equal for all flows as they share the same path of servers.
SFA, PMOO results will be equal for all flows as they share the same path of servers and the same arrival curves.

TFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0} = \alpha^{f_0} + \alpha^{f_1}$		$\sum_{j=0}^{1} \alpha^{f_j} = \gamma_{5,25}$	
	$D_{v_0}^{f_0}$		$\beta_{v_0} = b_{v_0}$ $10 \cdot [t-10]^+ = 25$ $t = 12\frac{1}{2}$	$\beta_{v_0} = \alpha_{v_0}$ $10 \cdot [t-10]^+ = 5 \cdot t + 25$ $t = 25$
	$B_{v_0}^{f_0}$		$\alpha_{v_0}(T_{v_0}) = 5 \cdot 10 + 25$ $= 75$	
v_0v_1	$\alpha_{v_0v_1} = (\alpha_{v_0})^*$	$r_{v_0v_1}$	$= 5$	
		$b_{v_0v_1}$	$\alpha_{v_0}(T_{v_0}) = 75$	
		$=$	$= \gamma_{5,75}$	
v_1	$\alpha_{v_1} = \alpha_{v_0v_1}$		$= \gamma_{5,75}$	
	$D_{v_1}^{f_0}$		$\beta_{v_1} = b_{v_1}$ $6 \cdot [t-6]^+ = 75$ $t = 18\frac{1}{2}$	$\beta_{v_1} = \alpha_{v_1}$ $6 \cdot [t-6]^+ = 5 \cdot t + 75$ $t = 111$
	$B_{v_1}^{f_0}$		$\alpha_{v_1}(T_{v_1}) = 5 \cdot 6 + 75$ $= 105$	
D^{f_0}			$\sum_{i=0}^{1} D_{v_i}^{f_0} = 31$	$\sum_{i=0}^{1} D_{v_i}^{f_0} = 136$
B^{f_0}			$\max_{i=\{0,1\}} b_{v_i}^{f_0} = 105$	

SFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0}^{xf_0} = \alpha^{f_1}$		$= \gamma_{2\frac{1}{2},12\frac{1}{2}}$	
	$\beta_{v_0}^{\text{l.o.}f_0} = [\beta_{v_0} - \alpha_{v_0}^{xf_0}]^+$	$R_{v_0}^{\text{l.o.}f_0}$	$= 7\frac{1}{2}$	
		$T_{v_0}^{\text{l.o.}f_0}$	$\beta_{v_0} = b_{v_0}^{xf_0}$ $10 \cdot [t-10]^+ = 12\frac{1}{2}$ $t = 11\frac{1}{4}$	$\beta_{v_0} = \alpha_{v_0}^{xf_0}$ $10 \cdot [t-10]^+ = 2\frac{1}{2} \cdot t + 12\frac{1}{2}$ $t = 15$
		$=$	$= \beta_{7\frac{1}{2},11\frac{1}{4}}$	$= \beta_{7\frac{1}{2},15}$
v_0v_1	$\alpha_{v_0v_1}^{xf_0}$	$r_{v_0v_1}^{xf_0}$	$= 2\frac{1}{2}$	
		$b_{v_0v_1}^{xf_0}$	$\alpha_{v_0}^{xf_0}(T_{v_0}) = 2\frac{1}{2} \cdot 10 + 12\frac{1}{2}$ $= 37\frac{1}{2}$	
		$=$	$= \gamma_{2\frac{1}{2},37\frac{1}{2}}$	
v_1	$\alpha_{v_1}^{xf_0} = \alpha_{v_0v_1}^{xf_0}$		$= \gamma_{2\frac{1}{2},37\frac{1}{2}}$	
	$\beta_{v_1}^{\text{l.o.}f_0} = [\beta_{v_1} - \alpha_{v_1}^{xf_0}]^+$	$R_{v_1}^{\text{l.o.}f_0}$	$= 3\frac{1}{2}$	
		$T_{v_1}^{\text{l.o.}f_0}$	$\beta_{v_1} = b_{v_1}^{xf_0}$ $6 \cdot [t-6]^+ = 37\frac{1}{2}$ $t = 12\frac{1}{4}$	$\beta_{v_1} = \alpha_{v_1}^{xf_0}$ $6 \cdot [t-6]^+ = 2\frac{1}{2} \cdot t + 37\frac{1}{2}$ $t = 21$
		$=$	$= \beta_{3\frac{1}{2},12\frac{1}{4}}$	$= \beta_{3\frac{1}{2},21}$
$\beta_{\text{e2e}}^{\text{l.o.}f_0} = \beta_{R_{\text{e2e}}^{\text{l.o.}f_0}, T_{\text{e2e}}^{\text{l.o.}f_0}}$			$\bigotimes_{i=0}^{1} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{3\frac{1}{2},23\frac{1}{2}}$	$\bigotimes_{i=0}^{1} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{3\frac{1}{2},36}$
D^{f_0}			$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $3\frac{1}{2} \cdot [t - 23\frac{1}{2}]^+ = 12\frac{1}{2}$ $t = 27\frac{1}{14}$	$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $3\frac{1}{2} \cdot [t-36]^+ = 12\frac{1}{2}$ $t = 39\frac{4}{7}$
B^{f_0}			$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 2\frac{1}{2} \cdot 23\frac{1}{2} + 12\frac{1}{2}$ $= 71\frac{1}{4}$	$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 2\frac{1}{2} \cdot 36 + 12\frac{1}{2}$ $= 102\frac{1}{2}$

PMOO			ARB_MUX
e2e	$\beta_{\text{e2e}}^{f_0}$		$\bigotimes_{i=0}^{1} \beta_{v_i} = \beta_{6,16}$
	$\alpha_{\text{e2e}}^{xf_0} = \alpha^{f_1}$		$= \gamma_{2\frac{1}{2},12\frac{1}{2}}$
	$\beta_{\text{e2e}}^{\text{l.o.}f_0} = [\beta_{\text{e2e}}^{f_0} - \alpha_{\text{e2e}}^{xf_0}]^+$	$R_{\text{e2e}}^{\text{l.o.}f_0}$	$= 3\frac{1}{2}$
		$T_{\text{e2e}}^{\text{l.o.}f_0}$	$\beta_{\text{e2e}}^{f_0} = \alpha_{\text{e2e}}^{xf_0}$ $6 \cdot [t-16]^+ = 2\frac{1}{2} \cdot t + 12\frac{1}{2}$ $t = 31$
		$=$	$= \beta_{3\frac{1}{2},31}$
D^{f_0}			$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $3\frac{1}{2} \cdot [t-31]^+ = 12\frac{1}{2}$ $t = 34\frac{4}{7}$
B^{f_0}			$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 2\frac{1}{2} \cdot 31 + 12\frac{1}{2}$ $= 90$

Tandem_1SCs_4Flows_1ACs_1Path



- $\beta_{v_0} = \beta_{v_1} = \beta_{R_{v_i},T_{v_i}} = \beta_{10,10}$, $i \in \{0,1\}$
- $\alpha^{f_i} = \gamma_{r^{f_j},b^{f_j}} = \gamma_{2,10}$, $j \in \{0,3\}$

Flows f_j, $j \in \{0,1,2,3\}$

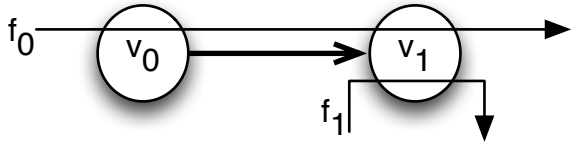
TFA results will be equal for all flows as they share the same path of servers.
SFA, PMOO results will be equal for all flows as they share the same path of servers and the same arrival curves.

TFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0} = \sum_{j=0}^{3} \alpha^{f_j}$		$= \gamma_{8,40}$	
	$D_{v_0}^{f_j}$		$\beta_{v_0} = b_{v_0}$ $10 \cdot [t-10]^+ = 40$ $t = 14$	$\beta_{v_0} = \alpha_{v_0}$ $10 \cdot [t-10]^+ = 8 \cdot t + 40$ $t = 70$
	$B_{v_0}^{f_j}$		$\alpha_{v_0}(T_{v_0}) = 8 \cdot 10 + 40$ $= 120$	
$v_0 v_1$	$\alpha_{v_0 v_1} = (\alpha_{v_0})^*$	$r_{v_0 v_1}$	$= 8$	
		$b_{v_0 v_1}$	$\alpha_{v_0}(T_{v_0}) = 120$	
		$=$	$= \gamma_{8,120}$	
v_1	$\alpha_{v_1} = \alpha_{v_0 v_1}$		$= \gamma_{8,120}$	
	$D_{v_1}^{f_0}$		$\beta_{v_1} = b_{v_1}$ $10 \cdot [t-10]^+ = 120$ $t = 22$	$\beta_{v_1} = \alpha_{v_1}$ $10 \cdot [t-10]^+ = 8 \cdot t + 120$ $t = 110$
	$B_{v_1}^{f_0}$		$\alpha_{v_1}(T_{v_1}) = 8 \cdot 10 + 120$ $= 200$	
D^{f_0}			$\sum_{i=0}^{1} D_{v_i}^{f_j} = 36$	$\sum_{i=0}^{1} D_{v_i}^{f_j} = 180$
B^{f_0}			$\max_{i=\{0,1\}} b_{v_i}^{f_j} = 200$	

SFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0}^{xf_j} = \sum_{k=0}^{2} \alpha^{f_k}$		$= \gamma_{6,30}$	
	$\beta_{v_0}^{\text{l.o.}f_j} = [\beta_{v_0} - \alpha_{v_0}^{xf_j}]^+$	$R_{v_0}^{\text{l.o.}f_j}$	$= 4$	
		$T_{v_0}^{\text{l.o.}f_j}$	$\beta_{v_0} = b_{v_0}^{xf_j}$ $10 \cdot [t-10]^+ = 30$ $t = 13$	$\beta_{v_0} = \alpha_{v_0}^{xf_j}$ $10 \cdot [t-10]^+ = 6 \cdot t + 30$ $t = 32\frac{1}{2}$
		$=$	$= \beta_{4,13}$	$= \beta_{4,32\frac{1}{2}}$
v_0v_1	$\alpha_{v_0v_1}^{xf_j}$	$r_{v_0v_1}^{xf_j}$	$= r_{v_0}^{xf_j} = 6$	
		$b_{v_0v_1}^{xf_j}$	$\alpha_{v_0}^{xf_j}(T_{v_0}) = 6 \cdot 10 + 30$ $= 90$	
		$=$	$= \gamma_{6,90}$	
v_1	$\alpha_{v_1}^{xf_j} = \alpha_{v_0v_1}^{xf_j}$		$= \gamma_{6,90}$	
	$\beta_{v_1}^{\text{l.o.}f_j} = [\beta_{v_1} - \alpha_{v_1}^{xf_j}]^+$	$R_{v_1}^{\text{l.o.}f_j}$	$= 4$	
		$T_{v_1}^{\text{l.o.}f_j}$	$\beta_{v_1} = b_{v_1}^{xf_j}$ $10 \cdot [t-10]^+ = 90$ $t = 19$	$\beta_{v_1} = \alpha_{v_1}^{xf_j}$ $10 \cdot [t-10]^+ = 4 \cdot t + 90$ $t = 47\frac{1}{2}$
		$=$	$= \beta_{4,19}$	$= \beta_{4,47\frac{1}{2}}$
$\beta_{\text{e2e}}^{\text{l.o.}f_j}$			$\bigotimes_{i=0}^{1} \beta_{v_i}^{\text{l.o.}f_j} = \beta_{4,32}$	$\bigotimes_{i=0}^{1} \beta_{v_i}^{\text{l.o.}f_j} = \beta_{4,80}$
D^{f_j}			$\beta_{\text{e2e}}^{\text{l.o.}f_j} = b^{f_j}$ $4 \cdot [t-32]^+ = 10$ $t = 34\frac{1}{2}$	$\beta_{\text{e2e}}^{\text{l.o.}f_j} = b^{f_j}$ $4 \cdot [t-80]^+ = 10$ $t = 82\frac{1}{2}$
B^{f_j}			$\alpha^{f_j}(T_{\text{e2e}}^{\text{l.o.}f_j}) = 2 \cdot 32 + 10$ $= 74$	$\alpha^{f_j}(T_{\text{e2e}}^{\text{l.o.}f_j}) = 2 \cdot 80 + 10$ $= 170$

<table>
<tr><th colspan="3">PMOO</th><th>ARB_MUX</th></tr>
<tr><td rowspan="5">e2e</td><td colspan="2">$\beta_{\text{e2e}}^{f_j}$</td><td>$\bigotimes_{i=0}^{1} \beta_{v_i} = \beta_{10,20}$</td></tr>
<tr><td colspan="2">$\alpha_{\text{e2e}}^{xf_j} = \sum_{j=0}^{2} \alpha^{f_j}$</td><td>$= \gamma_{6,30}$</td></tr>
<tr><td rowspan="3">$\beta_{\text{e2e}}^{\text{l.o.}f_j} = [\beta_{\text{e2e}}^{f_j} - \alpha_{\text{e2e}}^{xf_j}]^+$</td><td>$R_{\text{e2e}}^{\text{l.o.}f_j}$</td><td>$= 4$</td></tr>
<tr><td>$T_{\text{e2e}}^{\text{l.o.}f_j}$</td><td>$\beta_{\text{e2e}}^{f_j} = \alpha_{\text{e2e}}^{xf_j}$
$10 \cdot [t-20]^+ = 6 \cdot t + 30$
$t = 57\frac{1}{2}$</td></tr>
<tr><td>$=$</td><td>$= \beta_{4,57\frac{1}{2}}$</td></tr>
<tr><td colspan="2">D^{f_j}</td><td>$\beta_{\text{e2e}}^{\text{l.o.}f_j} = b^{f_j}$
$4 \cdot [t - 57\frac{1}{2}]^+ = 10$
$t = 60$</td></tr>
<tr><td colspan="2">B^{f_j}</td><td>$\alpha^{f_j}(T_{\text{e2e}}^{\text{l.o.}f_j}) = 2 \cdot 57\frac{1}{2} + 10$
$= 125$</td></tr>
</table>

Tandem_1SC_2Flows_1AC_2Paths



- $\beta_{v_0} = \beta_{v_1} = \beta_{R_{v_i},T_{v_i}} = \beta_{20,20},\ i \in \{0,1\}$
- $\alpha^{f_0} = \alpha^{f_1} = \gamma_{r^{f_j},b^{f_j}} = \gamma_{5,25},\ j \in \{0,1\}$

Flow f_0

TFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0} = \alpha^{f_0}$		$= \gamma_{5,25}$	
	$D_{v_0}^{f_0}$		$\beta_{v_0} = b^{f_0}$ $20 \cdot [t-20]^+ = 25$ $t = 21\frac{1}{4}$	FIFO per micro flow $\beta_{v_0} = b^{f_0}$ $20 \cdot [t-20]^+ = 25$ $t = 21\frac{1}{4}$
	$B_{v_0}^{f_0}$		$\alpha_{v_0}(T_{v_0}) = 5 \cdot 20 + 25$ $= 125$	
v_0v_1	$\alpha_{v_0v_1} = (\alpha_{v_0})^*$	$r_{v_0v_1}$	$= 5$	
		$b_{v_0v_1}$	$\alpha_{v_0}(T_{v_0}) = 125$	
		$=$	$= \gamma_{5,125}$	
v_1	$\alpha_{v_1} = \alpha^{f_1} + \alpha_{v_0v_1}$		$= \gamma_{5,25} + \gamma_{5,125} = \gamma_{10,150}$	
	$D_{v_1}^{f_0}$		$\beta_{v_1} = b_{v_1}$ $20 \cdot [t-20]^+ = 150$ $t = 27\frac{1}{2}$	$\beta_{v_1} = \alpha_{v_1}$ $20 \cdot [t-20]^+ = 10 \cdot t + 150$ $t = 55$
	$B_{v_1}^{f_0}$		$\alpha_{v_1}(T_{v_1}) = 10 \cdot 20 + 150$ $= 350$	
D^{f_0}			$\sum_{i=0}^{1} D_{v_i}^{f_0} = 48\frac{3}{4}$	$\sum_{i=0}^{1} D_{v_i}^{f_0} = 76\frac{1}{4}$
B^{f_0}			$\max_{i=\{0,1\}} b_{v_i}^{f_0} = 350$	

PMOO and SFA yield the same result because there is no tandem of servers to be convoluted before substracting common crossflows.

SFA, PMOO			FIFO_MUX (SFA only)	ARB_MUX
v_0	$\alpha_{v_0}^{xf_0}$		$= \gamma_{0,0}$	
	$\beta_{v_0}^{\text{l.o.}f_0} = \beta_{v_0}$		$= \beta_{20,20}$	
v_0v_1	$\alpha_{v_0v_1}^{xf_0}$		$= \gamma_{0,0}$	
v_1	$\alpha_{v_1}^{xf_0} = \alpha^{f_1} + \alpha_{v_0v_1}^{xf_0}$		$= \gamma_{5,25}$	
	$\beta_{v_1}^{\text{l.o.}f_0} = [\beta_{v_1} - \alpha_{v_1}^{xf_0}]^+$	$R_{v_1}^{\text{l.o.}f_0}$	$= 15$	
		$T_{v_1}^{\text{l.o.}f_0}$	$\beta_{v_1} = b_{v_1}^{xf_0}$ $20 \cdot [t-20]^+ = 25$ $t = 21\frac{1}{4}$	$\beta_{v_1} = \alpha_{v_1}^{xf_0}$ $20 \cdot [t-20]^+ = 5 \cdot t + 25$ $t = 28\frac{1}{3}$
		$=$	$= \beta_{15,21\frac{1}{4}}$	$= \beta_{15,28\frac{1}{3}}$
$\beta_{\text{e2e}}^{\text{l.o.}f_0} = \beta_{R_{\text{e2e}}^{\text{l.o.}f_0}, T_{\text{e2e}}^{\text{l.o.}f_0}}$			$\bigotimes_{i=0}^{1} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{15,41\frac{1}{4}}$	$\bigotimes_{i=0}^{1} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{15,48\frac{1}{3}}$
D^{f_0}			$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $15 \cdot [t - 41\frac{1}{4}]^+ = 25$ $t = 42\frac{11}{12}$	$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $15 \cdot [t - 48\frac{1}{3}]^+ = 25$ $t = 50$
B^{f_0}			$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 5 \cdot 41\frac{1}{4} + 25$ $= 231\frac{1}{4}$	$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 5 \cdot 48\frac{1}{3} + 25$ $= 266\frac{2}{3}$

Flow f_1

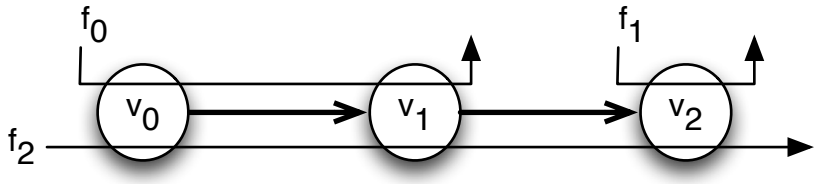
computeOutputBound$(v_0, f_0) = (\alpha_{v_0}^{f_0})^*$		FIFO_MUX	ARB_MUX
$(\alpha_{v_0}^{f_0})^* = \alpha_{v_0 v_1}^{f_0}$	$r_{v_0 v_1}^{f_0}$	$= 5$	
	$b_{v_0 v_1}^{f_0}$	$\alpha_{v_0}(T_{v_0}) = 125$	
	$=$	$= \gamma_{5,125}$	

TFA		FIFO_MUX	ARB_MUX
v_1	$\alpha_{v_1} = \alpha^{f_1} + \alpha^{f_0}_{v_0 v_1}$	$= \gamma_{5,25} + \gamma_{5,125} = \gamma_{10,150}$	
	$D^{f_1}_{v_1}$	$\beta_{v_1} = b_{v_1}$ $20 \cdot [t-20]^+ = 150$ $t = 27\frac{1}{2}$	$\beta_{v_1} = \alpha_{v_1}$ $20 \cdot [t-20]^+ = 10 \cdot t + 150$ $t = 55$
	$B^{f_1}_{v_1}$	$\alpha_{v_1}(T_{v_1}) = 10 \cdot 20 + 150$ $= 350$	
D^{f_1}		$\sum_{i=0}^{1} D^{f_1}_{v_i} = 27\frac{1}{2}$	$\sum_{i=0}^{1} D^{f_1}_{v_i} = 55$
B^{f_1}		$\max_{i=\{0,1\}} b^{f_1}_{v_i} = 350$	

PMOO and SFA yield the same result because there is no tandem of servers to be convoluted before substracting common crossflows.

SFA, PMOO			FIFO_MUX (SFA only)	ARB_MUX
v_0v_1	$\alpha_{v_0v_1}^{xf_1}$		$= \gamma_{5,125}$	
v_1	$\alpha_{v_1}^{xf_1} = \alpha_{v_0v_1}^{xf_1}$		$= \gamma_{5,125}$	
	$\beta_{v_1}^{\text{l.o.}f_1} = [\beta_{v_1} - \alpha_{v_1}^{xf_1}]^+ = \beta_{R_{v_1}^{\text{l.o.}f_1}, T_{v_1}^{\text{l.o.}f_1}}$	$R_{v_1}^{\text{l.o.}f_1}$	$= 15$	
		$T_{v_1}^{\text{l.o.}f_1}$	$\beta_{v_1} = b_{v_1}^{xf_1}$ $20 \cdot [t-20]^+ = 125$ $t = 26\frac{1}{4}$	$\beta_{v_1} = \alpha_{v_1}^{xf_1}$ $20 \cdot [t-20]^+ = 5 \cdot t + 125$ $t = 35$
		$=$	$= \beta_{15,26\frac{1}{4}}$	$= \beta_{15,35}$
$\beta_{\text{e2e}}^{\text{l.o.}f_1} = \beta_{R_{\text{e2e}}^{\text{l.o.}f_1}, T_{\text{e2e}}^{\text{l.o.}f_1}}$			$\bigotimes_{i=0}^{1} \beta_{v_i}^{\text{l.o.}f_1} = \beta_{15,26\frac{1}{4}}$	$\bigotimes_{i=0}^{1} \beta_{v_i}^{\text{l.o.}f_1} = \beta_{15,35}$
D^{f_1}			$\beta_{\text{e2e}}^{\text{l.o.}f_1} = b^{f_1}$ $15 \cdot [t-26\frac{1}{4}]^+ = 25$ $t = 27\frac{11}{12}$	$\beta_{\text{e2e}}^{\text{l.o.}f_1} = b^{f_1}$ $15 \cdot [t-35]^+ = 25$ $t = 36\frac{2}{3}$
B^{f_1}			$\alpha^{f_1}(T_{\text{e2e}}^{\text{l.o.}f_1}) = 5 \cdot 26\frac{1}{4} + 25$ $= 156\frac{1}{4}$	$\alpha^{f_1}(T_{\text{e2e}}^{\text{l.o.}f_1}) = 5 \cdot 35 + 25$ $= 200$

Tandem_1SC_3Flows_1AC_3Paths



- $\beta_{v_0} = \beta_{v_1} = \beta_{v_2} = \beta_{R_{v_i}, T_{v_i}} = \beta_{20,20}$, $i \in \{0, 1, 2\}$
- $\alpha^{f_0} = \alpha^{f_1} = \alpha^{f_2} = \gamma_{r^{f_j}, b^{f_j}} = \gamma_{5,25}$, $j \in \{0, 1, 2\}$

Flow f_0 (comparable to Tandem_1SC_2Flows_1AC_1Path)

TFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0} = \alpha^{f_0} + \alpha^{f_1}$		$= \gamma_{10,50}$	
	$D^{f_0}_{v_0}$		$\beta_{v_0} = b_{v_0}$ $20 \cdot [t-20]^+ = 50$ $t = 22\frac{1}{2}$	$\beta_{v_0} = \alpha_{v_0}$ $20 \cdot [t-20]^+ = 10 \cdot t + 50$ $t = 45$
	$B^{f_0}_{v_0}$		$\alpha_{v_0}(T_{v_0}) = 20 \cdot 10 + 50$ $= 250$	
v_0v_1	$\alpha_{v_0v_1} = (\alpha_{v_0})^*$	$r_{v_0v_1}$	$= 10$	
		$b_{v_0v_1}$	$\alpha_{v_0}(T_{v_0}) = 250$	
		$=$	$= \gamma_{10,250}$	
v_1	$\alpha_{v_1} = \alpha_{v_0v_1}$		$= \gamma_{10,250}$	
	$D^{f_0}_{v_1}$		$\beta_{v_1} = b_{v_1}$ $20 \cdot [t-20]^+ = 250$ $t = 32\frac{1}{2}$	$\beta_{v_1} = \alpha_{v_1}$ $20 \cdot [t-20]^+ = 10 \cdot t + 250$ $t = 65$
	$B^{f_0}_{v_1}$		$\alpha_{v_1}(T_{v_1}) = 10 \cdot 20 + 250$ $= 450$	
D^{f_0}			$\sum_{i=0}^{1} D^{f_0}_{v_i} = 55$	$\sum_{i=0}^{1} D^{f_0}_{v_i} = 110$
B^{f_0}			$\max_{i=\{0,1\}} b^{f_0}_{v_i} = 450$	

SFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0}^{xf_0} = \alpha^{f_2}$		$= \gamma_{5,25}$	
	$\beta_{v_0}^{\text{l.o.}f_0} = [\beta_{v_0} - \alpha_{v_0}^{xf_0}]^+$	$R_{v_0}^{\text{l.o.}f_0}$	$= 5$	
		$T_{v_0}^{\text{l.o.}f_0}$	$\beta_{v_0} = b_{v_0}^{xf_0}$ $20 \cdot [t-20]^+ = 25$ $t = 21\frac{1}{4}$	$\beta_{v_0} = \alpha_{v_0}^{xf_0}$ $20 \cdot [t-20]^+ = 5 \cdot t + 25$ $t = 28\frac{1}{3}$
		$=$	$= \beta_{15,21\frac{1}{4}}$	$= \beta_{15,28\frac{1}{3}}$
v_0v_1	$\alpha_{v_0v_1}^{xf_0} = \alpha_{v_0}^{xf_0} \oslash \beta_{v_0} = \alpha^{f_2} \oslash \beta_{v_0}$ (This is computeSfaOutputBound)	$r_{v_0v_1}^{xf_0}$	$= 5$	
		$b_{v_0v_1}^{xf_0}$	$\alpha_{v_0}^{xf_0}(T_{v_0}) = 5 \cdot 20 + 25$ $= 125$	
		$=$	$= \gamma_{5,125}$	
v_1	$\alpha_{v_1}^{xf_0} = \alpha_{v_0v_1}^{xf_0}$		$= \gamma_{5,125}$	
	$\beta_{v_1}^{\text{l.o.}f_0} = [\beta_{v_1} - \alpha_{v_1}^{xf_0}]^+$	$R_{v_1}^{\text{l.o.}f_0}$	$= 15$	
		$T_{v_1}^{\text{l.o.}f_0}$	$\beta_{v_1} = b_{v_1}^{xf_0}$ $20 \cdot [t-20]^+ = 125$ $t = 26\frac{1}{4}$	$\beta_{v_1} = \alpha_{v_1}^{xf_0}$ $20 \cdot [t-20]^+ = 5 \cdot t + 125$ $t = 35$
		$=$	$= \beta_{15,26\frac{1}{4}}$	$= \beta_{15,35}$
$\beta_{\text{e2e}}^{\text{l.o.}f_0} = \beta_{R_{\text{e2e}}^{\text{l.o.}f_0}, T_{\text{e2e}}^{\text{l.o.}f_0}}$			$\bigotimes_{i=0}^{1} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{15,47\frac{1}{2}}$	$\bigotimes_{i=0}^{1} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{15,63\frac{1}{3}}$
D^{f_0}			$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $15 \cdot [t-47\frac{1}{2}]^+ = 25$ $t = 49\frac{1}{6}$	$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $15 \cdot [t-63\frac{1}{3}]^+ = 25$ $t = 65$
B^{f_0}			$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 5 \cdot 47\frac{1}{2} + 25$ $= 262\frac{1}{2}$	$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 5 \cdot 63\frac{1}{3} + 25$ $= 341\frac{2}{3}$

<table>
<tr><th colspan="3">PMOO</th><th>ARB_MUX</th></tr>
<tr><td rowspan="5">e2e</td><td colspan="2">$\beta_{\text{e2e}}^{f_0}$</td><td>$\bigotimes_{i=0}^{1} \beta_{v_i} = \beta_{20,40}$</td></tr>
<tr><td colspan="2">$\alpha_{\text{e2e}}^{xf_0} = \alpha^{f_2}$</td><td>$= \gamma_{5,25}$</td></tr>
<tr><td rowspan="3">$\beta_{\text{e2e}}^{\text{l.o.}f_0} = [\beta_{\text{e2e}}^{f_0} - \alpha_{\text{e2e}}^{xf_0}]^+$</td><td>$R_{\text{e2e}}^{\text{l.o.}f_0}$</td><td>$= 15$</td></tr>
<tr><td>$T_{\text{e2e}}^{\text{l.o.}f_0}$</td><td>$\begin{aligned} \beta_{\text{e2e}}^{f_0} &= \alpha_{\text{e2e}}^{xf_0} \\ 20 \cdot [t-40]^+ &= 5 \cdot t + 25 \\ t &= 55 \end{aligned}$</td></tr>
<tr><td>$=$</td><td>$= \beta_{15,55}$</td></tr>
<tr><td colspan="2">D^{f_0}</td><td>$\begin{aligned} \beta_{\text{e2e}}^{\text{l.o.}f_0} &= b^{f_0} \\ 15 \cdot [t-55]^+ &= 25 \\ t &= 56\frac{2}{3} \end{aligned}$</td></tr>
<tr><td colspan="2">B^{f_0}</td><td>$\begin{aligned} \alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) &= 5 \cdot 55 + 25 \\ &= 300 \end{aligned}$</td></tr>
</table>

Flow f_1 (comparable with Node_2Flows_2ACs)

$\text{computeOutputBound}(v_0, f_2) = (\alpha_{v_0}^{f_2})^*$		FIFO_MUX	ARB_MUX
$\beta_{v_0}^{\text{l.o.}f_2} = [\beta_{v_0} - \alpha^{xf_2}]^+ = [\beta_{v_0} - \alpha^{f_0}]^+ = \beta_{R_{v_0}^{\text{l.o.}f_2}, T_{v_0}^{\text{l.o.}f_2}}$	$R_{v_0}^{\text{l.o.}f_2}$	$= 15$	
	$T_{v_0}^{\text{l.o.}f_2}$	$\beta_{v_0} = b_{v_0}^{f_2}$ $20 \cdot [t-20]^+ = 25$ $t = 21\frac{1}{4}$	$\beta_{v_0} = \alpha_{v_0}^{f_2}$ $20 \cdot [t-20]^+ = 5 \cdot t + 25$ $t = 28\frac{1}{3}$
	$=$	$= \beta_{15,21\frac{1}{4}}$	$= \beta_{15,28\frac{1}{3}}$
$(\alpha_{v_0}^{f_2})^* = \alpha_{v_0 v_1}^{f_2} = \alpha^{f_2} \oslash \beta_{v_0}^{\text{l.o.}f_2}$	$r_{v_0 v_1}^{f_2}$	$= 5$	
	$b_{v_0 v_1}^{f_2}$	$\alpha^{f_2}(T_{v_0}^{\text{l.o.}f_2}) = 131\frac{1}{4}$	$\alpha^{f_2}(T_{v_0}^{\text{l.o.}f_2}) = 166\frac{2}{3}$
	$=$	$= \gamma_{5,131\frac{1}{4}}$	$= \gamma_{5,166\frac{2}{3}}$

$\text{computeOutputBound}(v_0, f_0 = (\alpha_{v_0}^{f_0})^*$	FIFO_MUX	ARB_MUX
$(\alpha_{v_0}^{f_0})^* = (\alpha_{v_0}^{f_2})^*$	$= \gamma_{5,131\frac{1}{4}}$	$= \gamma_{5,166\frac{2}{3}}$

$\text{computeOutputBound}(v_1, f_2) = (\alpha_{v_1}^{f_2})^*$		FIFO_MUX	ARB_MUX
$\beta_{v_1}^{\text{l.o.}f_2} = [\beta_{v_1} - \alpha_{v_1}^{xf_2}]^+ = [\beta_{v_1} - (\alpha_{v_0}^{f_0})^*]^+ = \beta_{R_{v_1}^{\text{l.o.}f_2}, T_{v_1}^{\text{l.o.}f_2}}$	$R_{v_1}^{\text{l.o.}f_2}$	$= 15$	
	$T_{v_1}^{\text{l.o.}f_2}$	$\beta_{v_1} = b_{v_0 v_1}^{f_0}$ $20 \cdot [t-20]^+ = 131\frac{1}{4}$ $t = 26\frac{9}{16}$	$\beta_{v_1} = \alpha_{v_0 v_1}^{f_0}$ $20 \cdot [t-20]^+ = 5 \cdot t + 166\frac{2}{3}$ $t = 37\frac{7}{9}$
	$=$	$= \beta_{15,26\frac{9}{16}}$	$= \beta_{15,37\frac{7}{9}}$
$(\alpha_{v_1}^{f_2})^* = \alpha_{v_1 v_2}^{f_2} = (\alpha_{v_0}^{f_2})^* \oslash \beta_{v_1}^{\text{l.o.}f_2}$	$r_{v_1 v_2}^{f_2}$	$= 5$	
	$b_{v_1 v_2}^{f_2}$	$(\alpha_{v_0}^{f_2})^*(T_{v_1}^{\text{l.o.}f_2}) = 264\frac{1}{16}$	$(\alpha_{v_0}^{f_2})^*(T_{v_1}^{\text{l.o.}f_2}) = 355\frac{5}{9}$
	$=$	$= \gamma_{5,264\frac{1}{16}}$	$= \gamma_{5,355\frac{5}{9}}$

TFA		FIFO_MUX	ARB_MUX
v_2	$\alpha_{v_2} = \alpha^{f_1} + \alpha^{f_2}_{v_1 v_2}$	$\gamma_{5,25} + \gamma_{5,264\frac{1}{16}} = \gamma_{10,289\frac{1}{16}}$	$\gamma_{5,25} + \gamma_{5,355\frac{5}{9}} = \gamma_{10,380\frac{5}{9}}$
	$D^{f_1}_{v_2}$	$\beta_{v_2} = b_{v_2}$ $20 \cdot [t-20]^+ = 289\frac{1}{16}$ $t = 34\frac{29}{64}$	$\beta_{v_2} = \alpha_{v_2}$ $20 \cdot [t-20]^+ = 10 \cdot t + 380\frac{5}{9}$ $t = 78\frac{5}{90}$
	$B^{f_1}_{v_2}$	$\alpha_{v_2}(T_{v_2}) = 10 \cdot 20 + 289\frac{1}{16}$ $= 489\frac{1}{16}$	$\alpha_{v_2}(T_{v_2}) = 10 \cdot 20 + 380\frac{5}{9}$ $= 580\frac{5}{9}$
D^{f_1}		$= 34\frac{29}{64}$	$= 78\frac{5}{90}$
B^{f_1}		$= 489\frac{1}{16}$	$= 580\frac{5}{9}$

SFA			FIFO_MUX	ARB_MUX
v_2	$\beta_{v_2}^{\text{l.o.}f_1} = [\beta_{v_2} - \alpha_{v_2}^{xf_1}]^+ = [\beta_{v_2} - \alpha_{v_1v_2}^{f_2}]^+$	$R_{v_2}^{\text{l.o.}f_1}$	$= R_{v_2} - r_{v_1v_2}^{f_2} = 15$	
		$T_{v_2}^{\text{l.o.}f_1}$	$\beta_{v_1} = b_{v_1v_2}^{f_2}$ $20 \cdot [t-20]^+ = 264\frac{1}{16}$ $t = 33\frac{13}{64}$	$\beta_{v_1} = \alpha_{v_1v_2}^{f_2}$ $20 \cdot [t-20]^+ = 5 \cdot t + 355\frac{5}{9}$ $t = 50\frac{10}{27}$
		$=$	$=\beta_{15,33\frac{13}{64}}$	$=\beta_{15,50\frac{10}{27}}$
$\beta_{\text{e2e}}^{\text{l.o.}f_1} = \beta_{v_2}^{\text{l.o.}f_1}$			$=\beta_{15,33\frac{13}{64}}$	$=\beta_{15,50\frac{10}{27}}$
D^{f_1}			$\beta_{v_2}^{\text{l.o.}f_1} = b^{f_1}$ $15 \cdot [t-33\frac{13}{64}]^+ = 25$ $t = 34\frac{167}{192}$	$\beta_{v_2}^{\text{l.o.}f_1} = b^{f_1}$ $15 \cdot [t-50\frac{10}{27}]^+ = 25$ $t = 52\frac{1}{27}$
B^{f_1}			$\alpha^{f_1}(T_{v_2}^{\text{l.o.}f_1}) = 5 \cdot 33\frac{13}{64} + 25$ $= 191\frac{1}{64}$	$\alpha^{f_1}(T_{\text{e2e}}^{\text{l.o.}f_1}) = 5 \cdot 50\frac{10}{27} + 25$ $= 276\frac{23}{27}$

A recursive SFA calculation using f_2's SFA left-over service curve to calculate $\alpha^{f_2}_{v_1v_2}$ yields slightly tighter bounds, however, it is not implemented in the DISCO Network Calculator yet.

SFA			FIFO_MUX	ARB_MUX
v_1v_2	$\beta^{\text{l.o.}f_0}_{v_0v_1} = \beta^{\text{l.o.}f_0}_{\text{e2e}}$ (see SFA for f_0 above)		$= \beta_{15,47\frac{1}{2}}$	$= \beta_{15,63\frac{1}{3}}$
	$\alpha^{xf_1}_{v_1v_2} = \alpha^{f_2} \oslash \beta^{\text{l.o.}f_0}_{\text{e2e}}$	$r^{xf_1}_{v_1v_2}$	$= r^{f_2} = 5$	
		$b^{xf_1}_{v_1v_2}$	$\alpha^{f_2}(T^{\text{l.o.}f_0}_{v_0v_1}) = 5 \cdot 47\frac{1}{2} + 25$ $= 262\frac{1}{2}$	$\alpha^{f_2}(T^{\text{l.o.}f_0}_{v_0v_1}) = 5 \cdot 63\frac{1}{3} + 25$ $= 341\frac{2}{3}$
		$=$	$= \gamma_{5,262\frac{1}{2}}$	$= \gamma_{5,341\frac{2}{3}}$
v_2	$\alpha^{xf_1}_{v_2} = \alpha^{xf_1}_{v_1v_2}$		$= \gamma_{5,262\frac{1}{2}}$	$= \gamma_{5,341\frac{2}{3}}$
	$\beta^{\text{l.o.}f_1}_{v_2} = [\beta_{v_2} - \alpha^{xf_1}_{v_2}]^+ = [\beta_{v_2} - \alpha^{xf_1}_{v_1v_2}]^+$	$R^{\text{l.o.}f_1}_{v_2}$	$= 15$	
		$T^{\text{l.o.}f_1}_{v_2}$	$\beta_{v_2} = b^{xf_1}_{v_2}$ $20 \cdot [t-20]^+ = 262\frac{1}{2}$ $t = 33\frac{1}{8}$	$\beta_{v_2} = \alpha^{xf_1}_{v_2}$ $20 \cdot [t-20]^+ = 5 \cdot t + 341\frac{2}{3}$ $t = 49\frac{4}{9}$
		$=$	$=\beta_{15,33\frac{1}{8}}$	$=\beta_{15,49\frac{4}{9}}$
$\beta^{\text{l.o.}f_1}_{\text{e2e}} = \beta^{\text{l.o.}f_1}_{v_2}$			$=\beta_{15,33\frac{1}{8}}$	$=\beta_{15,49\frac{4}{9}}$
D^{f_1}			$\beta^{\text{l.o.}f_1}_{\text{e2e}} = b^{f_1}$ $15 \cdot [t-33\frac{1}{8}]^+ = 25$ $t = 34\frac{19}{24}$	$\beta^{\text{l.o.}f_1}_{\text{e2e}} = b^{f_1}$ $15 \cdot [t-49\frac{4}{9}]^+ = 25$ $t = 51\frac{1}{9}$
B^{f_1}			$\alpha^{f_1}(T^{\text{l.o.}f_1}_{\text{e2e}}) = 5 \cdot 33\frac{1}{8} + 25$ $= 190\frac{5}{8}$	$\alpha^{f_1}(T^{\text{l.o.}f_1}_{\text{e2e}}) = 5 \cdot 49\frac{4}{9} + 25$ $= 272\frac{2}{9}$

In contrast to the SFA, the PMOO analysis calculates output bounds needed to abstrac the topology to a tandem recursively.

PMOO			ARB_MUX
v_1v_2	$\beta^{\text{l.o.}f_2}_{v_0v_1} = \beta^{\text{l.o.}f_0}_{\text{e2e}}$ (compare with PMOO for f_0 above)		$= \beta_{15,55}$
	$\alpha^{xf_1}_{v_1v_2} = \alpha^{f_2} \oslash \beta^{\text{l.o.}f_2}_{v_0v_1}$	$r^{xf_1}_{v_1v_2}$	$= 5$
		$b^{xf_1}_{v_1v_2}$	$\alpha^{f_2}(T^{\text{l.o.}f_0}_{v_0v_1}) = 5 \cdot 55 + 25 = 300$
		$=$	$= \gamma_{5,300}$
v_2	$\alpha^{xf_1}_{v_2} = \alpha^{xf_1}_{v_1v_2}$		$= \gamma_{5,300}$
	$\beta^{\text{l.o.}f_1}_{v_2} = [\beta_{v_2} - \alpha^{xf_1}_{v_2}]^+ = [\beta_{v_2} - \alpha^{xf_1}_{v_1v_2}]^+$	$R^{\text{l.o.}f_1}_{v_2}$	$= 15$
		$T^{\text{l.o.}f_1}_{v_2}$	$\beta_{v_2} = \alpha^{xf_1}_{v_2}$ $20 \cdot [t-20]^+ = 5 \cdot t + 300$ $t = 46\frac{2}{3}$
		$=$	$=\beta_{15,46\frac{2}{3}}$
$\beta^{\text{l.o.}f_1}_{\text{e2e}} = \beta^{\text{l.o.}f_1}_{v_2}$			$=\beta_{15,46\frac{2}{3}}$
D^{f_1}			$\beta^{\text{l.o.}f_1}_{\text{e2e}} = b^{f_1}$ $15 \cdot [t - 46\frac{2}{3}]^+ = 25$ $t = 48\frac{1}{3}$
B^{f_1}			$\alpha^{f_1}(T^{\text{l.o.}f_1}_{\text{e2e}}) = 5 \cdot 46\frac{2}{3} + 25 = 258\frac{1}{3}$

Flow f_2

TFA bounds for flow f_2 can be calculated from the results for f_0 and f_2, although that is not the way the DISCO Network Calculator retrieves the bounds. Here's potential for the Network Calculator to increase performance by reusing cahced results.

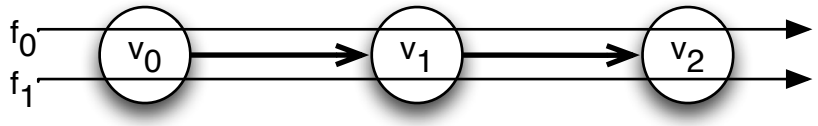
TFA	FIFO_MUX	ARB_MUX
$D^{f_2} = D^{f_0} + D^{f_1}$	$55 + 34\frac{29}{64} = 89\frac{29}{64}$	$110 + 78\frac{5}{90} = 188\frac{5}{90}$
$B^{f_2} = \max\{B^{f_0}, B^{f_1}\}$	$\max\{450, 489\frac{1}{16}\} = 489\frac{1}{16}$	$\max\{450, 508\frac{5}{9}\} = 508\frac{5}{9}$

Although SFA does not recursively calculate the necessary output bounds, it yields the right result if there's no cross traffic coming from outside the flow of interest's path.

SFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0}^{xf_2} = \alpha^{f_0}$		$= \gamma_{5,25}$	
	$\beta_{v_0}^{\text{l.o.}f_2} = [\beta_{v_0} - \alpha_{v_0}^{xf_2}]^+ = [\beta_{v_0} - \alpha_{v_0}^{f_0}]^+$	$R_{v_0}^{\text{l.o.}f_2}$	$= 5$	
		$T_{v_0}^{\text{l.o.}f_2}$	$\beta_{v_0} = b_{v_0}^{xf_2}$ $20 \cdot [t-20]^+ = 25$ $t = 21\frac{1}{4}$	$\beta_{v_0} = \alpha_{v_0}^{xf_2}$ $20 \cdot [t-20]^+ = 5 \cdot t + 25$ $t = 28\frac{1}{3}$
		$=$	$= \beta_{15,21\frac{1}{4}}$	$= \beta_{15,28\frac{1}{3}}$
v_0v_1	$\alpha_{v_0v_1}^{xf_2} = \alpha_{v_0}^{xf_2} \oslash \beta_{v_0} = \alpha^{f_0} \oslash \beta_{v_0}$ (This is computeSfaOuputBound)	$r_{v_0v_1}^{xf_2}$	$= 5$	
		$b_{v_0v_1}^{xf_2}$	$\alpha_{v_0}^{xf_2}(T_{v_0}) = 5 \cdot 20 + 25$ $= 125$	
		$=$	$= \gamma_{5,125}$	
v_1	$\alpha_{v_1}^{xf_2} = \alpha_{v_0v_1}^{xf_2}$		$= \gamma_{5,125}$	
	$\beta_{v_1}^{\text{l.o.}f_2} = [\beta_{v_1} - \alpha_{v_1}^{xf_2}]^+$	$R_{v_1}^{\text{l.o.}f_2}$	$= 15$	
		$T_{v_1}^{\text{l.o.}f_2}$	$\beta_{v_1} = b_{v_1}^{xf_2}$ $20 \cdot [t-20]^+ = 125$ $t = 26\frac{1}{4}$	$\beta_{v_1} = \alpha_{v_1}^{xf_2}$ $20 \cdot [t-20]^+ = 5 \cdot t + 125$ $t = 35$
		$=$	$= \beta_{15,26\frac{1}{4}}$	$= \beta_{15,35}$
v_1v_2	$\alpha_{v_1v_2}^{xf_2}$ (This is computeSfaOuputBound)		$= \gamma_{0,0}$	
v_2	$\alpha_{v_2}^{xf_2} = \alpha^{f_1} + \alpha_{v_1v_2}^{xf_2}$		$= \gamma_{5,25}$	
	$\beta_{v_2}^{\text{l.o.}f_2} = [\beta_{v_2} - \alpha_{v_2}^{xf_2}]^+ = [\beta_{v_2} - \alpha^{f_1}]^+$	$R_{v_2}^{\text{l.o.}f_2}$	$= 15$	
		$T_{v_2}^{\text{l.o.}f_2}$	$\beta_{v_2} = b_{v_2}^{xf_2}$ $20 \cdot [t-20]^+ = 25$ $t = 21\frac{1}{4}$	$\beta_{v_2} = \alpha_{v_2}^{xf_2}$ $20 \cdot [t-20]^+ = 5 \cdot t + 25$ $t = 28\frac{1}{3}$
		$=$	$= \beta_{15,21\frac{1}{4}}$	$= \beta_{15,28\frac{1}{3}}$
$\beta_{\text{e2e}}^{\text{l.o.}f_2}$			$\bigotimes_{i=0}^{2} \beta_{v_i}^{\text{l.o.}f_2} = \beta_{15,68\frac{3}{4}}$	$\bigotimes_{i=0}^{2} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{15,91\frac{2}{3}}$
D^{f_2}			$\beta_{\text{e2e}}^{\text{l.o.}f_2} = b^{f_2}$ $15 \cdot [t - 68\frac{3}{4}]^+ = 25$ $t = 70\frac{5}{12}$	$\beta_{\text{e2e}}^{\text{l.o.}f_2} = b^{f_2}$ $15 \cdot [t - 91\frac{2}{3}]^+ = 25$ $t = 93\frac{1}{3}$
B^{f_2}			$\alpha^{f_2}(T_{v_2}^{\text{l.o.}f_2}) = 5 \cdot 68\frac{3}{4} + 25$ $= 368\frac{3}{4}$	$\alpha^{f_2}(T_{\text{e2e}}^{\text{l.o.}f_2}) = 5 \cdot 91\frac{2}{3} + 25$ $= 483\frac{1}{3}$

PMOO		ARB_MUX
v_0v_1	$\beta^{\text{l.o.}f_2}_{v_0v_1} = \beta^{\text{l.o.}f_0}_{\text{e2e}}$	$= \beta_{15,55}$
v_2	$\beta^{\text{l.o.}f_2}_{\text{e2e}} = \beta^{\text{l.o.}f_1}_{v_2}$	$= \beta_{15,28\frac{1}{3}}$
$\beta^{\text{l.o.}f_2}_{\text{e2e}} = \beta^{\text{l.o.}f_0}_{\text{e2e}} \otimes \beta^{\text{l.o.}f_1}_{v_2}$		$= \beta_{15,55} \otimes \beta_{15,28\frac{1}{3}} = \beta_{15,83\frac{1}{3}}$
D^{f_2}		$\begin{aligned} \beta^{\text{l.o.}f_2}_{\text{e2e}} &= b^{f_1} \\ 15 \cdot [t - 83\frac{1}{3}] &= 25 \\ t &= 85 \end{aligned}$
B^{f_2}		$\begin{aligned} \alpha^{f_0}(T^{\text{l.o.}f_0}_{\text{e2e}}) &= 5 \cdot 83\frac{1}{3} + 25 \\ &= 441\frac{2}{3} \end{aligned}$

Tandem_1SC_2Flows_1AC_1Path_v2



- $\beta_{v_0} = \beta_{v_1} = \beta_{v_2} = \beta_{R_{v_i},T_{v_i}} = \beta_{20,20}$, $i \in \{0, 1\}$
- $\alpha^{f_0} = \alpha^{f_1} = \gamma_{r^{f_j},b^{f_j}} = \gamma_{5,25}$, $j \in \{0, 1\}$

Flows f_0, f_1

TFA results will be equal for all flows as they share the same path of servers.
SFA, PMOO results will be equal for all flows as they share the same path of servers and the same arrival curves.

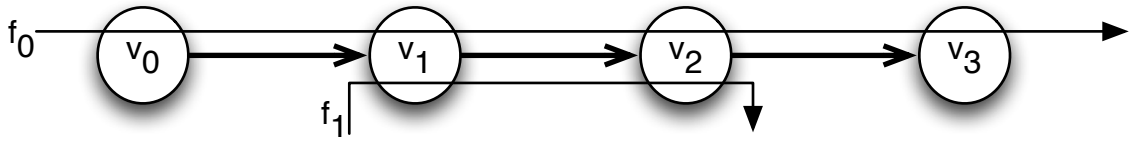
Here you the third parameter's magic. It enables calculating the output bound for an aggregate.

TFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0} = \alpha^{f_0} + \alpha^{f_1}$		$= \gamma_{10,50}$	
	$D_{v_0}^{f_0}$		$\beta_{v_0} = b_{v_0}$ $20 \cdot [t-20]^+ = 50$ $t = 22\frac{1}{2}$	$\beta_{v_0} = \alpha_{v_0}$ $20 \cdot [t-20]^+ = 10 \cdot t + 50$ $t = 45$
	$B_{v_0}^{f_0}$		$\alpha_{v_0}(T_{v_0}) = 10 \cdot 20 + 50$ $= 250$	
v_0v_1	$\alpha_{v_0v_1} = (\alpha_{v_0})^*$	$r_{v_0v_1}$	$= 10$	
		$b_{v_0v_1}$	$\alpha_{v_0}(T_{v_0}) = 250$	
		$=$	$= \gamma_{10,250}$	
v_1	$\alpha_{v_1} = \alpha_{v_0v_1}$		$= \gamma_{10,250}$	
	$D_{v_1}^{f_0}$		$\beta_{v_1} = b_{v_1}$ $20 \cdot [t-20]^+ = 250$ $t = 32\frac{1}{2}$	$\beta_{v_1} = \alpha_{v_1}$ $20 \cdot [t-20]^+ = 10 \cdot t + 250$ $t = 65$
	$B_{v_1}^{f_0}$		$\alpha_{v_1}(T_{v_1}) = 10 \cdot 20 + 250$ $= 450$	
v_1v_2	$\alpha_{v_1v_2} = (\alpha_{v_1})^*$	$r_{v_1v_2}$	$= 10$	
		$b_{v_1v_2}$	$\alpha_{v_1}(T_{v_1}) = 450$	
		$=$	$= \gamma_{10,450}$	
v_2	$\alpha_{v_2}^{f_0} = \alpha_{v_1v_2}$		$= \gamma_{10,450}$	
	$D_{v_2}^{f_0}$		$\beta_{v_2} = b_{v_2}$ $20 \cdot [t-20]^+ = 450$ $t = 42\frac{1}{2}$	$\beta_{v_2} = \alpha_{v_2}$ $20 \cdot [t-20]^+ = 10 \cdot t + 450$ $t = 85$
	$B_{v_2}^{f_0}$		$\alpha_{v_1}(T_{v_1}) = 10 \cdot 20 + 450$ $= 650$	
D^{f_0}			$\sum_{i=0}^{2} D_{v_i}^{f_0} = 97\frac{1}{2}$	$\sum_{i=0}^{2} D_{v_i}^{f_0} = 195$
B^{f_0}			$\max_{i=\{0,1,2\}} b_{v_i}^{f_0} = 650$	

SFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0}^{xf_0} = \alpha^{f_1}$		$= \gamma_{5,25}$	
	$\beta_{v_0}^{\text{l.o.}f_0} = [\beta_{v_0} - \alpha_{v_0}^{xf_0}]^+ = \beta_{R_{v_0}^{\text{l.o.}f_0}, T_{v_0}^{\text{l.o.}f_0}}$	$R_{v_0}^{\text{l.o.}f_0}$	$= 15$	
		$T_{v_0}^{\text{l.o.}f_0}$	$\beta_{v_0} = b_{v_0}^{xf_0}$ $20 \cdot [t-20]^+ = 25$ $t = 22\frac{1}{4}$	$\beta_{v_0} = \alpha_{v_0}^{xf_0}$ $20 \cdot [t-20]^+ = 5 \cdot t + 25$ $t = 28\frac{1}{3}$
		$=$	$= \beta_{15,21\frac{1}{4}}$	$= \beta_{15,28\frac{1}{3}}$
v_0v_1	$\alpha_{v_0v_1}^{xf_0} = (\alpha_{v_0}^{xf_0})^*$	$r_{v_0v_1}^{xf_0}$	$= 5$	
		$b_{v_0v_1}^{xf_0}$	$\alpha_{v_0}^{xf_0}(T_{v_0}) = 5 \cdot 20 + 25$ $= 125$	
		$=$	$= \gamma_{5,125}$	
v_1	$\alpha_{v_1}^{xf_0} = \alpha_{v_0v_1}^{xf_0}$		$= \gamma_{5,125}$	
	$\beta_{v_1}^{\text{l.o.}f_0} = [\beta_{v_1} - \alpha_{v_1}^{xf_0}]^+$	$R_{v_1}^{\text{l.o.}f_0}$	$= 15$	
		$T_{v_1}^{\text{l.o.}f_0}$	$\beta_{v_1} = b_{v_1}^{xf_0}$ $20 \cdot [t-20]^+ = 125$ $t = 26\frac{1}{4}$	$\beta_{v_1} = \alpha_{v_1}^{xf_0}$ $20 \cdot [t-20]^+ = 5 \cdot t + 125$ $t = 35$
		$=$	$= \beta_{15,26\frac{1}{4}}$	$= \beta_{15,35}$
v_1v_2	$\alpha_{v_1v_2}^{xf_0} = (\alpha_{v_1}^{xf_0})^*$	$r_{v_1v_2}^{xf_0}$	$= 5$	
		$b_{v_1v_2}^{xf_0}$	$\alpha_{v_1}^{xf_0}(T_{v_1}) = 5 \cdot 20 + 125$ $= 225$	
		$=$	$= \gamma_{5,225}$	
v_2	$\alpha_{v_2}^{xf_0} = \alpha_{v_1v_2}^{xf_0}$		$= \gamma_{5,225}$	
	$\beta_{v_2}^{\text{l.o.}f_0} = [\beta_{v_2} - \alpha_{v_2}^{xf_0}]^+$	$R_{v_2}^{\text{l.o.}f_0}$	$= 15$	
		$T_{v_2}^{\text{l.o.}f_0}$	$\beta_{v_2} = b_{v_2}^{xf_0}$ $20 \cdot [t-20]^+ = 225$ $t = 31\frac{1}{4}$	$\beta_{v_2} = \alpha_{v_2}^{xf_0}$ $20 \cdot [t-20]^+ = 5 \cdot t + 225$ $t = 41\frac{2}{3}$
		$=$	$= \beta_{15,31\frac{1}{4}}$	$= \beta_{15,41\frac{2}{3}}$
$\beta_{\text{e2e}}^{\text{l.o.}f_0} = \beta_{R_{\text{e2e}}^{\text{l.o.}f_0}, T_{\text{e2e}}^{\text{l.o.}f_0}}$			$\bigotimes_{i=0}^{2} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{5,78\frac{3}{4}}$	$\bigotimes_{i=0}^{2} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{5,105}$
D^{f_0}			$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $15 \cdot [t - 78\frac{3}{4}]^+ = 25$ $t = 80\frac{5}{12}$	$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $15 \cdot [t-105]^+ = 25$ $t = 106\frac{2}{3}$
B^{f_0}			$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 5 \cdot 78\frac{3}{4} + 25$ $= 418\frac{3}{4}$	$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 5 \cdot 105 + 25$ $= 550$

<table>
<tr><th colspan="3">PMOO</th><th>ARB_MUX</th></tr>
<tr><td rowspan="4">e2e</td><td colspan="2">$\beta_{\text{e2e}}^{f_0}$</td><td>$\bigotimes_{i=0}^{2} \beta_{v_i} = \beta_{20,60}$</td></tr>
<tr><td colspan="2">$\alpha_{\text{e2e}}^{xf_0} = \alpha^{f_1}$</td><td>$= \gamma_{5,25}$</td></tr>
<tr><td rowspan="3">$\beta_{\text{e2e}}^{\text{l.o.}f_0} = [\beta_{\text{e2e}}^{f_0} - \alpha_{\text{e2e}}^{xf_0}]^+$</td><td>$R_{\text{e2e}}^{\text{l.o.}f_0}$</td><td>$= 15$</td></tr>
<tr><td>$T_{\text{e2e}}^{\text{l.o.}f_0}$</td><td>$\begin{aligned} \beta_{\text{e2e}}^{f_0} &= \alpha_{\text{e2e}}^{xf_0} \\ 20 \cdot [t-60]^+ &= 5 \cdot t + 25 \\ t &= 81\frac{2}{3} \end{aligned}$</td></tr>
<tr><td>$=$</td><td>$= \beta_{15,81\frac{2}{3}}$</td></tr>
<tr><td colspan="2">D^{f_0}</td><td>$\begin{aligned} \beta_{\text{e2e}}^{\text{l.o.}f_0} &= b^{f_0} \\ 15 \cdot [t - 81\frac{2}{3}]^+ &= 25 \\ t &= 83\frac{1}{3} \end{aligned}$</td></tr>
<tr><td colspan="2">B^{f_0}</td><td>$\begin{aligned} \alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) &= 5 \cdot 81\frac{2}{3} + 25 \\ &= 433\frac{1}{3} \end{aligned}$</td></tr>
</table>

Tandem_1SC_2Flows_1AC_2Path_v2



- $\beta_{v_0} = \beta_{v_1} = \beta_{v_2} = \beta_{v_3} = \beta_{R_{v_i},T_{v_i}} = \beta_{20,20}$, $i \in \{0,1\}$
- $\alpha^{f_0} = \alpha^{f_1} = \gamma_{r^{f_j},b^{f_j}} = \gamma_{5,25}$, $j \in \{0,1\}$

$\text{computeOutputBound}(v_0, f_0) = (\alpha_{v_0}^{f_0})^* = \alpha_{v_0 v_1}^{f_0}$		FIFO_MUX	ARB_MUX
$\alpha_{v_0}^{xf_0}$		$= \gamma_{0,0}$	
$\beta_{v_0}^{\text{l.o.}f_0} = [\beta_{v_0} - \alpha_{v_0}^{xf_0}]^+ = \beta_{v_0}$		$= \beta_{20,20}$	
$\alpha_{v_0 v_1}^{f_0} = \alpha^{f_0} \oslash \beta_{v_0}^{\text{l.o.}f_0} = \alpha^{f_0} \oslash \beta_{v_0}$	$r_{v_0 v_1}^{f_0}$	$= 5$	
	$b_{v_0 v_1}^{f_0}$	$\alpha^{f_0}(T_{v_0}^{\text{l.o.}f_0}) = 125$	
	$=$	$= \gamma_{5,125}$	

$\text{computeOutputBound}(v_1, f_0) = (\alpha_{v_1}^{f_0})^* = \alpha_{v_1 v_2}^{f_0}$		FIFO_MUX	ARB_MUX
$\alpha_{v_1}^{xf_0} = \alpha^{f_1}$		$= \gamma_{5,25}$	
$\beta_{v_1}^{\text{l.o.}f_0} = [\beta_{v_1} - \alpha_{v_1}^{xf_0}]^+$	$R_{v_1}^{\text{l.o.}f_0}$	$= 15$	
	$T_{v_1}^{\text{l.o.}f_0}$	$\beta_{v_1} = b_{v_1}^{xf_0}$ $20 \cdot [t-20]^+ = 25$ $t = 21\frac{1}{4}$	$\beta_{v_1} = \alpha_{v_1}^{xf_0}$ $20 \cdot [t-20]^+ = 5 \cdot t + 25$ $t = 28\frac{1}{3}$
	$=$	$= \beta_{15,21\frac{1}{4}}$	$= \beta_{15,28\frac{1}{3}}$
$\alpha_{v_1 v_2}^{f_0} = \alpha_{v_1}^{f_0} \oslash \beta_{v_1}^{\text{l.o.}f_0} = \alpha_{v_0 v_1}^{f_0} \oslash \beta_{v_1}^{\text{l.o.}f_0}$	$r_{v_1 v_2}^{f_0}$	$= 5$	
	$b_{v_1 v_2}^{f_0}$	$\alpha_{v_0 v_1}^{f_0}(T_{v_1}^{\text{l.o.}f_0}) = 231\frac{1}{4}$	$\alpha_{v_0 v_1}^{f_0}(T_{v_1}^{\text{l.o.}f_0}) = 266\frac{2}{3}$
	$=$	$= \gamma_{5,231\frac{1}{4}}$	$= \gamma_{5,266\frac{2}{3}}$

$\text{computeOutputBound}(v_1, f_1) = (\alpha_{v_1}^{f_1})^* = \alpha_{v_1 v_2}^{f_1}$		FIFO_MUX	ARB_MUX
$\alpha_{v_1}^{xf_1} = \alpha_{v_0 v_1}^{f_0}$		$= \gamma_{5,125}$	
$\beta_{v_1}^{\text{l.o.}f_1} = [\beta_{v_1} - \alpha_{v_1}^{xf_1}]^+$	$R_{v_1}^{\text{l.o.}f_1}$	$= 15$	
	$T_{v_1}^{\text{l.o.}f_1}$	$\beta_{v_1} = b_{v_1}^{xf_1}$ $20 \cdot [t-20]^+ = 125$ $t = 26\frac{1}{4}$	$\beta_{v_1} = \alpha_{v_1}^{xf_1}$ $20 \cdot [t-20]^+ = 5 \cdot t + 125$ $t = 35$
	$=$	$= \beta_{15,26\frac{1}{4}}$	$= \beta_{15,35}$
$\alpha_{v_1 v_2}^{f_1} = \alpha_{v_1}^{f_1} \oslash \beta_{v_1}^{\text{l.o.}f_1} = \alpha^{f_1} \oslash \beta_{v_1}^{\text{l.o.}f_1}$	$r_{v_1 v_2}^{f_1}$	$= 5$	
	$b_{v_1 v_2}^{f_1}$	$\alpha^{f_1}(T_{v_1}^{\text{l.o.}f_1}) = 156\frac{1}{4}$	$\alpha^{f_1}(T_{v_1}^{\text{l.o.}f_1}) = 200$
	$=$	$= \gamma_{5,156\frac{1}{4}}$	$= \gamma_{5,200}$

$\text{computeOutputBound}(v_2, f_0) = (\alpha_{v_2}^{f_0})^* = \alpha_{v_2 v_3}^{f_0}$		FIFO_MUX	ARB_MUX
$\alpha_{v_2}^{xf_0} = \alpha_{v_1 v_2}^{f_1}$		$= \gamma_{5,156\frac{1}{4}}$	$= \gamma_{5,200}$
$\beta_{v_2}^{\text{l.o.}f_0} = [\beta_{v_2} - \alpha_{v_2}^{xf_0}]^+$	$R_{v_2}^{\text{l.o.}f_0}$	$= 15$	
	$T_{v_2}^{\text{l.o.}f_0}$	$\beta_{v_2} = b_{v_2}^{xf_0}$ $20 \cdot [t-20]^+ = 156\frac{1}{4}$ $t = 27\frac{13}{16}$	$\beta_{v_2} = \alpha_{v_2}^{xf_0}$ $20 \cdot [t-20]^+ = 5 \cdot t + 200$ $t = 40$
	$=$	$= \beta_{15,27\frac{13}{16}}$	$= \beta_{15,40}$
$\alpha_{v_2 v_3}^{f_0} = \alpha_{v_2}^{f_0} \oslash \beta_{v_2}^{\text{l.o.}f_0} = \alpha_{v_1 v_2}^{f_0} \oslash \beta_{v_1}^{\text{l.o.}f_0}$	$r_{v_2 v_3}^{f_0}$	$= 5$	
	$b_{v_2 v_3}^{f_0}$	$\alpha_{v_1 v_2}^{f_0}(T_{v_2}^{\text{l.o.}f_0}) = 370\frac{5}{16}$	$\alpha_{v_1 v_2}^{f_0}(T_{v_2}^{\text{l.o.}f_0}) = 466\frac{2}{3}$
	$=$	$= \gamma_{5,370\frac{5}{16}}$	$= \gamma_{5,466\frac{2}{3}}$

$\text{computeFifoOutputBound}(v_1, f_1) = (\alpha_{v_1}^{f_1})^* = \alpha_{v_1 v_2}^{f_1}$ for f_0 as flow of interest		FIFO_MUX	ARB_MUX
$\alpha_{v_1}^{x f_1}$		$= \gamma_{0,0}$	
$\beta_{v_1}^{\text{l.o.}f_1} = [\beta_{v_1} - \alpha_{v_1}^{x f_1}]^+$		$= \beta_{20,20}$	
$\alpha_{v_1 v_2}^{f_1} = \alpha_{v_1}^{f_1} \oslash \beta_{v_1}^{\text{l.o.}f_1} = \alpha^{f_1} \oslash \beta_{v_1}$	$r_{v_1 v_2}^{f_1}$	$= 5$	
	$b_{v_1 v_2}^{f_1}$	$\alpha^{f_1}(T_{v_1}^{\text{l.o.}f_1}) = 125$	
	$=$	$= \gamma_{5,125}$	

$\text{computeFifoOutputBound}(v_1, f_0) = (\alpha_{v_1}^{f_0})^* = \alpha_{v_1 v_2}^{f_0}$ for f_1 as flow of interest		FIFO_MUX	ARB_MUX
$\alpha_{v_1}^{x f_0}$		$= \gamma_{0,0}$	
$\beta_{v_1}^{\text{l.o.}f_0} = [\beta_{v_1} - \alpha_{v_1}^{x f_0}]^+$		$= \beta_{20,20}$	
$\alpha_{v_1 v_2}^{f_0} = \alpha_{v_0 v_1}^{f_0} \oslash \beta_{v_1}^{\text{l.o.}f_0} = (\alpha_{v_0}^{f_0})^* \oslash \beta_{v_1}$	$r_{v_1 v_2}^{f_0}$	$= 5$	
	$b_{v_1 v_2}^{f_0}$	$\alpha_{v_0 v_1}^{f_0}(T_{v_1}^{\text{l.o.}f_0}) = 225$	
	$=$	$= \gamma_{5,225}$	

Flow f_0

At v_2v_3 you can see the reason the network calculator moves backwards from a node to the flow of interest's source. Otherwise you don't know which flows you need separately lateron and thus could not tell which computeOutputBound calculations were necessary.

TFA		FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0} = \alpha^{f_0}$	$= \gamma_{5,25}$	
	$D_{v_0}^{f_0}$	$\beta_{v_0} = b_{v_0}$ $20 \cdot [t-20]^+ = 25$ $t = 21\frac{1}{4}$	FIFO per microflow $\beta_{v_0} = b_{v_0}$ $20 \cdot [t-20]^+ = 25$ $t = 21\frac{1}{4}$
	$B_{v_0}^{f_0}$	$\alpha_{v_0}(T_{v_0}) = 5 \cdot 20 + 25$ $= 125$	
v_0v_1	$\alpha_{v_0v_1} = (\alpha_{v_0})^*$	$= \gamma_{5,125}$	
v_1	$\alpha_{v_1} = \alpha^{f_1} + \alpha_{v_0v_1}$	$= \gamma_{5,25} + \gamma_{5,125} = \gamma_{10,150}$	
	$D_{v_1}^{f_0}$	$\beta_{v_1} = b_{v_1}$ $20 \cdot [t-20]^+ = 150$ $t = 27\frac{1}{2}$	$\beta_{v_1} = \alpha_{v_1}$ $20 \cdot [t-20]^+ = 10 \cdot t + 150$ $t = 55$
	$B_{v_1}^{f_0}$	$\alpha_{v_1}(T_{v_1}) = 10 \cdot 20 + 150$ $= 350$	
v_1v_2	$\alpha_{v_1v_2} = (\alpha_{v_1})^*$	$= \gamma_{10,350}$	
v_2	$\alpha_{v_2} = \alpha_{v_1v_2}$	$= \gamma_{10,350}$	
	$D_{v_2}^{f_0}$	$\beta_{v_2} = b_{v_2}$ $20 \cdot [t-20]^+ = 350$ $t = 37\frac{1}{2}$	$\beta_{v_2} = \alpha_{v_2}$ $20 \cdot [t-20]^+ = 10 \cdot t + 350$ $t = 75$
	$B_{v_2}^{f_0}$	$\alpha_{v_2}(T_{v_2}) = 10 \cdot 20 + 350$ $= 550$	
v_2v_3	$\alpha_{v_2v_3} = (\alpha_{v_2}^{f_0})^*$	$= \gamma_{5,370\frac{5}{16}}$	$= \gamma_{5,466\frac{2}{3}}$
v_3	$\alpha_{v_3} = \alpha_{v_2v_3}$	$= \gamma_{5,370\frac{5}{16}}$	$= \gamma_{5,466\frac{2}{3}}$
	$D_{v_3}^{f_0}$	$\beta_{v_3} = b_{v_3}$ $20 \cdot [t-20]^+ = 370\frac{5}{16}$ $t = 38\frac{33}{64}$	FIFO per micro flow $\beta_{v_3} = b_{v_3}$ $20 \cdot [t-20]^+ = 466\frac{2}{3}$ $t = 43\frac{1}{3}$
	$B_{v_3}^{f_0}$	$\alpha_{v_3}(T_{v_3}) = 5 \cdot 20 + 370\frac{5}{16}$ $= 470\frac{5}{16}$	$\alpha_{v_3}(T_{v_3}) = 5 \cdot 20 + 466\frac{2}{3}$ $= 566\frac{2}{3}$
D^{f_0}		$\sum_{i=0}^{3} D_{v_i}^{f_0} = 124\frac{49}{64}$	$\sum_{i=0}^{3} D_{v_i}^{f_0} = 194\frac{7}{12}$
B^{f_0}		$\max_{i=0}^{3} b_{v_i}^{f_0} = 550$	$\max_{i=0}^{3} b_{v_i}^{f_0} = 566\frac{2}{3}$

SFA			FIFO_MUX	ARB_MUX
v_0	$\alpha_{v_0}^{xf_0}$		$= \gamma_{0,0}$	
	$\beta_{v_0}^{\text{l.o.}f_0}$		$= \beta_{20,20}$	
v_0v_1	$\alpha_{v_0v_1}^{xf_0}$		$= \gamma_{0,0}$	
v_1	$\alpha_{v_1}^{xf_0} = \alpha^{f_1} + \alpha_{v_0v_1}^{xf_0} = \alpha^{f_1}$		$= \gamma_{5,25}$	
	$\beta_{v_1}^{\text{l.o.}f_0} = [\beta_{v_1} - \alpha_{v_1}^{xf_0}]^+$	$R_{v_1}^{\text{l.o.}f_0}$	$= 15$	
		$T_{v_1}^{\text{l.o.}f_0}$	$\beta_{v_1} = b_{v_1}^{xf_0}$ $20 \cdot [t-20]^+ = 25$ $t = 21\frac{1}{4}$	$\beta_{v_1} = \alpha_{v_1}^{xf_0}$ $20 \cdot [t-20]^+ = 5 \cdot t + 25$ $t = 28\frac{1}{3}$
		$=$	$= \beta_{15,21\frac{1}{4}}$	$= \beta_{15,28\frac{1}{3}}$
v_1v_2	$\alpha_{v_1v_2}^{xf_0} = (\alpha_{v_1}^{xf_0})^* = (\alpha_{v_1}^{f_1})^*$		$= \gamma_{5,125}$	
v_2	$\alpha_{v_2}^{xf_0} = \alpha_{v_1v_2}^{xf_0}$		$= \gamma_{5,125}$	
	$\beta_{v_2}^{\text{l.o.}f_0} = [\beta_{v_2} - \alpha_{v_2}^{xf_0}]^+$	$R_{v_2}^{\text{l.o.}f_0}$	$= 15$	
		$T_{v_2}^{\text{l.o.}f_0}$	$\beta_{v_2} = b_{v_2}^{xf_0}$ $20 \cdot [t-20]^+ = 125$ $t = 26\frac{1}{4}$	$\beta_{v_2} = \alpha_{v_2}^{xf_0}$ $20 \cdot [t-20]^+ = 5 \cdot t + 125$ $t = 35$
		$=$	$= \beta_{15,26\frac{1}{4}}$	$= \beta_{15,35}$
v_2v_3	$\alpha_{v_0v_1}^{xf_0}$		$= \gamma_{0,0}$	
v_3	$\alpha_{v_3}^{xf_0} = \alpha_{v_2v_3}^{xf_0}$		$= \gamma_{0,0}$	
	$\beta_{v_3}^{\text{l.o.}f_0} = [\beta_{v_3} - \alpha_{v_3}^{xf_0}]^+$		$= \beta_{20,20}$	
$\beta_{\text{e2e}}^{\text{l.o.}f_0} = \beta_{R_{\text{e2e}}^{\text{l.o.}f_0}, T_{\text{e2e}}^{\text{l.o.}f_0}}$			$\bigotimes_{i=0}^{3} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{15,87\frac{1}{2}}$	$\bigotimes_{i=0}^{3} \beta_{v_i}^{\text{l.o.}f_0} = \beta_{15,103\frac{1}{3}}$
D^{f_0}			$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $15 \cdot [t-87\frac{1}{2}]^+ = 25$ $t = 89\frac{1}{6}$	$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $15 \cdot [t-103\frac{1}{3}]^+ = 25$ $t = 105$
B^{f_0}			$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 5 \cdot 87\frac{1}{2} + 25$ $= 462\frac{1}{2}$	$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 5 \cdot 103\frac{1}{3} + 25$ $= 541\frac{2}{3}$

PMOO			ARB_MUX
v_0	$\beta_{v_0}^{f_0} = \beta_{v_0}$		$= \beta_{20,20}$
	$\alpha_{v_0}^{xf_0}$		$= \gamma_{0,0}$
	$\beta_{v_0}^{\text{l.o.}f_0} = \beta_{v_0}$		$= \beta_{20,20}$
v_1v_2	$\beta_{v_1v_2}^{f_0} = \beta_{v_1} \otimes \beta_{v_2}$		$= \beta_{20,40}$
	$\alpha_{v_1v_2}^{xf_0} = \alpha^{f_1}$		$= \gamma_{5,25}$
	$\beta_{v_1v_2}^{\text{l.o.}f_0} = [\beta_{v_1v_2}^{f_0} - \alpha_{v_1v_2}^{xf_0}]^+$	$R_{v_1v_2}^{\text{l.o.}f_0}$	$= 15$
		$T_{v_1v_2}^{\text{l.o.}f_0}$	$\beta_{v_1v_2}^{f_0} = \alpha_{v_1v_2}^{xf_0}$ $20 \cdot [t-40]^+ = 5 \cdot t + 25$ $t = 55$
		$=$	$= \beta_{15,55}$
v_3	$\beta_{v_0}^{f_0} = \beta_{v_0}$		$= \beta_{20,20}$
	$\alpha_{v_0}^{xf_0}$		$= \gamma_{0,0}$
	$\beta_{v_0}^{\text{l.o.}f_0} = \beta_{v_0}$		$= \beta_{20,20}$
e2e	$\beta_{\text{e2e}}^{f_0} = \beta_{v_0}^{f_0} \otimes \beta_{v_1v_2}^{f_0} \otimes \beta_{v_2}^{f_0}$		$= \beta_{15,95}$
	$\alpha_{\text{e2e}}^{xf_0}$		$= \gamma_{0,0}$
	$\beta_{\text{e2e}}^{\text{l.o.}f_0} = [\beta_{\text{e2e}}^{f_0} - \alpha_{\text{e2e}}^{xf_0}]^+$		$= \beta_{15,95}$
D^{f_0}			$\beta_{\text{e2e}}^{\text{l.o.}f_0} = b^{f_0}$ $15 \cdot [t-95]^+ = 25$ $t = 96\frac{2}{3}$
B^{f_0}			$\alpha^{f_0}(T_{\text{e2e}}^{\text{l.o.}f_0}) = 5 \cdot 95 + 25$ $= 500$

Flow f_1

TFA			FIFO_MUX	ARB_MUX
v_1	$\alpha_{v_1} = \alpha^{f_1} + \alpha_{v_0 v_1}$		$= \gamma_{5,25} + \gamma_{5,125} = \gamma_{10,150}$	
	$D_{v_1}^{f_0}$		$\beta_{v_1} = b_{v_1}$ $20 \cdot [t-20]^+ = 150$ $t = 27\frac{1}{2}$	$\beta_{v_1} = \alpha_{v_1}$ $20 \cdot [t-20]^+ = 10 \cdot t + 150$ $t = 55$
	$B_{v_1}^{f_0}$		$\alpha_{v_1}(T_{v_1}) = 10 \cdot 20 + 150$ $= 350$	
$v_1 v_2$	$\alpha_{v_1 v_2} = (\alpha_{v_1})^*$	$r_{v_1 v_2}$	$= 10$	
		$b_{v_1 v_2}$	$\alpha_{v_1}(T_{v_1}) = 350$	
		$=$	$= \gamma_{10,350}$	
v_2	$\alpha_{v_2} = \alpha_{v_1 v_2}$		$= \gamma_{10,350}$	
	$D_{v_2}^{f_0}$		$\beta_{v_2} = b_{v_2}$ $20 \cdot [t-20]^+ = 350$ $t = 37\frac{1}{2}$	$\beta_{v_2} = \alpha_{v_2}$ $20 \cdot [t-20]^+ = 10 \cdot t + 350$ $t = 75$
	$B_{v_2}^{f_0}$		$\alpha_{v_2}(T_{v_2}) = 10 \cdot 20 + 350$ $= 550$	
D^{f_0}			$\sum_{i=1}^{2} D_{v_i}^{f_0} = 65$	$\sum_{i=1}^{2} D_{v_i}^{f_0} = 130$
B^{f_0}			$\max_{i=1}^{2} b_{v_i}^{f_0} = 550$	

SFA			FIFO_MUX	ARB_MUX
v_1	$\alpha_{v_1}^{xf_1} = \alpha_{v_0v_1}^{xf_1} = \alpha_{v_0v_1}^{f_0}$		$= \gamma_{5,125}$	
	$\beta_{v_1}^{\text{l.o.}f_1} = [\beta_{v_1} - \alpha_{v_1}^{xf_1}]^+$	$R_{v_1}^{\text{l.o.}f_1}$	$= 15$	
		$T_{v_1}^{\text{l.o.}f_1}$	$\beta_{v_1} = b_{v_1}^{xf_1}$ $20 \cdot [t-20]^+ = 125$ $t = 26\frac{1}{4}$	$\beta_{v_1} = \alpha_{v_1}^{xf_0}$ $20 \cdot [t-20]^+ = 5 \cdot t + 125$ $t = 35$
		$=$	$= \beta_{15,26\frac{1}{4}}$	$= \beta_{15,35}$
v_1v_2	$\alpha_{v_1v_2}^{xf_1} = (\alpha_{v_1}^{xf_1})^* = (\alpha_{v_1}^{f_1})^*$		$= \gamma_{5,225}$	
v_2	$\alpha_{v_2}^{xf_1} = \alpha_{v_1v_2}^{xf_1}$		$= \gamma_{5,225}$	
	$\beta_{v_2}^{\text{l.o.}f_1} = [\beta_{v_2} - \alpha_{v_2}^{xf_1}]^+$	$R_{v_2}^{\text{l.o.}f_1}$	$= 15$	
		$T_{v_2}^{\text{l.o.}f_1}$	$\beta_{v_2} = b_{v_2}^{xf_1}$ $20 \cdot [t-20]^+ = 225$ $t = 31\frac{1}{4}$	$\beta_{v_2} = \alpha_{v_2}^{xf_1}$ $20 \cdot [t-20]^+ = 5 \cdot t + 225$ $t = 41\frac{2}{3}$
		$=$	$= \beta_{15,31\frac{1}{4}}$	$= \beta_{15,41\frac{2}{3}}$
$\beta_{\text{e2e}}^{\text{l.o.}f_1} = \beta_{R_{\text{e2e}}^{\text{l.o.}f_1}, T_{\text{e2e}}^{\text{l.o.}f_1}}$			$\bigotimes_{i=1}^{2} \beta_{v_i}^{\text{l.o.}f_1} = \beta_{15,57\frac{1}{2}}$	$\bigotimes_{i=1}^{2} \beta_{v_i}^{\text{l.o.}f_1} = \beta_{15,76\frac{2}{3}}$
D^{f_1}			$\beta_{\text{e2e}}^{\text{l.o.}f_1} = b^{f_1}$ $15 \cdot [t-57\frac{1}{2}]^+ = 25$ $t = 59\frac{1}{6}$	$\beta_{\text{e2e}}^{\text{l.o.}f_1} = b^{f_1}$ $15 \cdot [t-76\frac{2}{3}]^+ = 25$ $t = 78\frac{1}{3}$
B^{f_1}			$\alpha^{f_1}(T_{\text{e2e}}^{\text{l.o.}f_1}) = 5 \cdot 57\frac{1}{2} + 25$ $= 312\frac{1}{2}$	$\alpha^{f_1}(T_{\text{e2e}}^{\text{l.o.}f_1}) = 5 \cdot 76\frac{2}{3} + 25$ $= 408\frac{1}{3}$

<table>
<tr><th colspan="3">PMOO</th><th>ARB_MUX</th></tr>
<tr><td rowspan="5">e2e</td><td colspan="2">$\beta_{\text{e2e}}^{f_0} = \beta_{v_1} \otimes \beta_{v_2}$</td><td>$= \beta_{20,40}$</td></tr>
<tr><td colspan="2">$\alpha_{\text{e2e}}^{xf_1} = \alpha_{v_1} = \alpha_{v_0 v_1}^{f_0}$</td><td>$= \gamma_{5,125}$</td></tr>
<tr><td rowspan="3">$\beta_{\text{e2e}}^{\text{l.o.}f_1} = [\beta_{\text{e2e}}^{f_1} - \alpha_{\text{e2e}}^{xf_1}]^+$</td><td>$R_{\text{e2e}}^{\text{l.o.}f_1}$</td><td>$= 15$</td></tr>
<tr><td>$T_{\text{e2e}}^{\text{l.o.}f_1}$</td><td>$\begin{aligned} \beta_{\text{e2e}}^{f_1} &= \alpha_{\text{e2e}}^{xf_1} \\ 20 \cdot [t-40]^+ &= 5 \cdot t + 125 \\ t &= 61\frac{2}{3} \end{aligned}$</td></tr>
<tr><td>$=$</td><td>$= \beta_{15,61\frac{2}{3}}$</td></tr>
<tr><td colspan="3">D^{f_1}</td><td>$\begin{aligned} \beta_{\text{e2e}}^{\text{l.o.}f_1} &= b^{f_1} \\ 15 \cdot [t - 61\frac{2}{3}]^+ &= 25 \\ t &= 63\frac{1}{3} \end{aligned}$</td></tr>
<tr><td colspan="3">B^{f_1}</td><td>$\begin{aligned} \alpha^{f_1}(T_{\text{e2e}}^{\text{l.o.}f_1}) &= 5 \cdot 61\frac{2}{3} + 25 \\ &= 333\frac{1}{3} \end{aligned}$</td></tr>
</table>