|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 00:00:00,206 --> 00:00:02,120 | 大家好 |  |
| 2 | 00:00:02,121 --> 00:00:05,380 | 我是来自openfive的陈卫荣 |  |
| 3 | 00:00:05,887 --> 00:00:07,846 | 最近讲话讲的有点多 |  |
| 4 | 00:00:07,890 --> 00:00:09,234 | 所以我的喉咙有点哑 |  |
| 5 | 00:00:09,234 --> 00:00:10,909 | 我尽量会响一些 |  |
| 6 | 00:00:11,575 --> 00:00:14,415 | 今天带来的主题其实跟 |  |
| 7 | 00:00:14,509 --> 00:00:17,003 | 之前讲过的一些topic |  |
| 8 | 00:00:17,003 --> 00:00:18,731 | 有很大的不同 |  |
| 9 | 00:00:19,153 --> 00:00:21,475 | 这里大家可能会问几个问题 |  |
| 10 | 00:00:21,476 --> 00:00:22,275 | 第一个问题 |  |
| 11 | 00:00:22,534 --> 00:00:24,675 | openfive是一家什么样的公司 |  |
| 12 | 00:00:24,881 --> 00:00:26,381 | 它跟RISC-V有什么关系 |  |
| 13 | 00:00:26,681 --> 00:00:28,415 | 它跟SiFive有没有关系 |  |
| 14 | 00:00:28,806 --> 00:00:30,175 | 我们做的事情是什么样的 |  |
| 15 | 00:00:30,176 --> 00:00:32,218 | 如何去服务与我们中国市场 |  |
| 16 | 00:00:32,218 --> 00:00:34,375 | 和我们看到的一些客户应用 |  |
| 17 | 00:00:36,712 --> 00:00:39,384 | 我先用一分钟 |  |
| 18 | 00:00:39,384 --> 00:00:41,536 | 简单介绍一下openfive |  |
| 19 | 00:00:42,109 --> 00:00:44,016 | 介绍openfive之前 |  |
| 20 | 00:00:44,120 --> 00:00:47,490 | 我想我是在2017年的时候 |  |
| 21 | 00:00:47,490 --> 00:00:48,580 | 了解到RISC-V |  |
| 22 | 00:00:48,937 --> 00:00:50,868 | 我是从一个RISC-V小白 |  |
| 23 | 00:00:50,868 --> 00:00:52,040 | 开始接触到RISC-V |  |
| 24 | 00:00:52,368 --> 00:00:54,003 | 然后有加入到 |  |
| 25 | 00:00:54,162 --> 00:00:56,781 | 当时SiFive在国内设立的公司 |  |
| 26 | 00:00:56,781 --> 00:00:57,800 | 就是SiFiveChina |  |
| 27 | 00:00:57,800 --> 00:01:00,260 | 现在叫做上海赛昉科技 |  |
| 28 | 00:01:00,731 --> 00:01:02,878 | 我在2020年的时候 |  |
| 29 | 00:01:03,425 --> 00:01:05,850 | 组建了openfive中国 |  |
| 30 | 00:01:06,146 --> 00:01:09,500 | openfive是SiFive的一个独立的BU |  |
| 31 | 00:01:09,540 --> 00:01:10,487 | 就base unit |  |
| 32 | 00:01:10,787 --> 00:01:12,956 | SiFive有两个独立的BU |  |
| 33 | 00:01:13,071 --> 00:01:14,960 | 第一个BU是CPU BU |  |
| 34 | 00:01:15,212 --> 00:01:16,762 | 第二个BU就是 |  |
| 35 | 00:01:16,987 --> 00:01:19,609 | 定制Arch和SoC IP的BU |  |
| 36 | 00:01:19,843 --> 00:01:24,353 | HP是在美国的加州 |  |
| 37 | 00:01:24,853 --> 00:01:27,115 | 我们的主要业务 |  |
| 38 | 00:01:27,115 --> 00:01:29,955 | 主要是SoC的设计和定制开发 |  |
| 39 | 00:01:30,065 --> 00:01:31,890 | 还有一部分就是我们会 |  |
| 40 | 00:01:31,890 --> 00:01:33,455 | 提供差异化的IP |  |
| 41 | 00:01:33,756 --> 00:01:35,231 | 我们看一下一些数字 |  |
| 42 | 00:01:35,450 --> 00:01:38,606 | 整个团队有超过15年的行业经验 |  |
| 43 | 00:01:38,906 --> 00:01:40,687 | 我们为客户 |  |
| 44 | 00:01:41,046 --> 00:01:43,099 | 累计交付的芯片产品 |  |
| 45 | 00:01:43,099 --> 00:01:44,589 | 超过1.5亿颗 |  |
| 46 | 00:01:44,871 --> 00:01:47,021 | 在这1.5亿颗的芯片当中 |  |
| 47 | 00:01:47,200 --> 00:01:51,375 | 它的每百万颗的失效率是25 |  |
| 48 | 00:01:52,084 --> 00:01:56,809 | 完成的芯片流片数量超过350颗芯片 |  |
| 49 | 00:01:57,275 --> 00:02:00,322 | 你也看到在下面就是GSA |  |
| 50 | 00:02:00,696 --> 00:02:03,805 | 有在每一年的评奖过程当中 |  |
| 51 | 00:02:03,806 --> 00:02:06,921 | 有给到当时的open silicon和SiFive |  |
| 52 | 00:02:07,065 --> 00:02:08,378 | 一共有5次 |  |
| 53 | 00:02:08,643 --> 00:02:12,665 | 最受尊敬的私营半导体公司 |  |
| 54 | 00:02:13,059 --> 00:02:15,865 | 所以结合那么多的团队经验 |  |
| 55 | 00:02:15,865 --> 00:02:16,740 | 和历史 |  |
| 56 | 00:02:16,780 --> 00:02:19,240 | 你会发现SiFive跟openfive |  |
| 57 | 00:02:19,896 --> 00:02:22,393 | 是一个很有机的一个结合体 |  |
| 58 | 00:02:24,546 --> 00:02:27,681 | 我们主要服务的 |  |
| 59 | 00:02:27,681 --> 00:02:29,730 | 客户的应用方向 |  |
| 60 | 00:02:29,975 --> 00:02:32,630 | 我们可以简单介绍一下是三个 |  |
| 61 | 00:02:32,870 --> 00:02:35,270 | 第一个是高性能的计算 |  |
| 62 | 00:02:35,430 --> 00:02:37,890 | 还有就是针对网络通信的 |  |
| 63 | 00:02:38,178 --> 00:02:40,871 | 中间是在 |  |
| 64 | 00:02:40,871 --> 00:02:42,890 | 企业级的存储控制方面 |  |
| 65 | 00:02:43,228 --> 00:02:46,310 | 在最右边是我们的H |  |
| 66 | 00:02:46,346 --> 00:02:47,808 | 它是一个协议处理器 |  |
| 67 | 00:02:48,112 --> 00:02:49,884 | 对应的openfive |  |
| 68 | 00:02:50,090 --> 00:02:52,470 | 也准备了各种技术的积累 |  |
| 69 | 00:02:52,730 --> 00:02:55,037 | 包括大家之前在 |  |
| 70 | 00:02:55,037 --> 00:02:56,725 | 新闻上有看到的 |  |
| 71 | 00:02:57,040 --> 00:02:59,031 | 像5nm的一颗 |  |
| 72 | 00:02:59,031 --> 00:03:00,975 | 采用RISC-V的CPU处理器 |  |
| 73 | 00:03:01,184 --> 00:03:03,550 | 以及HBM3 |  |
| 74 | 00:03:04,134 --> 00:03:05,568 | 高带宽memory接口 |  |
| 75 | 00:03:05,856 --> 00:03:09,200 | 还有D2D I/F这样一颗测试芯片 |  |
| 76 | 00:03:09,275 --> 00:03:10,886 | 是台积电5nm的工艺 |  |
| 77 | 00:03:11,256 --> 00:03:13,460 | 中间部分我们准备的什么呢 |  |
| 78 | 00:03:13,700 --> 00:03:16,262 | 是一个2.5D的封装技术 |  |
| 79 | 00:03:16,580 --> 00:03:19,018 | 和我们现在最热的一个 |  |
| 80 | 00:03:19,018 --> 00:03:20,340 | 话题叫Chiplets |  |
| 81 | 00:03:20,540 --> 00:03:21,959 | 后面我们也会展开 |  |
| 82 | 00:03:22,115 --> 00:03:24,913 | 在SoC的平台方面 |  |
| 83 | 00:03:25,050 --> 00:03:26,770 | 我们有推出一个这样 |  |
| 84 | 00:03:27,010 --> 00:03:28,450 | vision的AI的一个【】 |  |
| 85 | 00:03:28,712 --> 00:03:32,710 | 当中使用到了SiFive的8核U74 |  |
| 86 | 00:03:32,890 --> 00:03:34,781 | 以及SiFive的其他的一些 |  |
| 87 | 00:03:34,918 --> 00:03:36,484 | 控制的CPU |  |
| 88 | 00:03:36,825 --> 00:03:38,996 | 以及secret IP |  |
| 89 | 00:03:39,237 --> 00:03:40,818 | 其中还有一部分 |  |
| 90 | 00:03:40,818 --> 00:03:42,619 | 是我们的第三方的 |  |
| 91 | 00:03:42,855 --> 00:03:44,431 | IP的ecosystem partner |  |
| 92 | 00:03:44,431 --> 00:03:45,475 | 跟我们一起合作的 |  |
| 93 | 00:03:45,825 --> 00:03:48,403 | 这颗芯片未来也将会对 |  |
| 94 | 00:03:48,403 --> 00:03:50,795 | 整个RISC-V在AI的 |  |
| 95 | 00:03:50,975 --> 00:03:53,662 | vision的处理方面 |  |
| 96 | 00:03:53,850 --> 00:03:55,837 | 会有蛮大的生态推动作用 |  |
| 97 | 00:03:58,534 --> 00:04:01,956 | 我们能做的东西其实 |  |
| 98 | 00:04:02,450 --> 00:04:03,318 | 简单来讲 |  |
| 99 | 00:04:03,437 --> 00:04:07,707 | 除了我们的定制的SoC之外 |  |
| 100 | 00:04:07,945 --> 00:04:09,821 | 我们在每一个 |  |
| 101 | 00:04:09,821 --> 00:04:11,545 | 先进的工艺节点上面 |  |
| 102 | 00:04:11,725 --> 00:04:13,725 | 每一年都会有大量投入 |  |
| 103 | 00:04:14,005 --> 00:04:15,165 | 您看它在中间 |  |
| 104 | 00:04:15,385 --> 00:04:18,065 | 我们从22nm到28nm |  |
| 105 | 00:04:18,100 --> 00:04:20,160 | 这是应该在七八年之前 |  |
| 106 | 00:04:20,485 --> 00:04:22,884 | 那到三四年之前我们投入了 |  |
| 107 | 00:04:22,884 --> 00:04:26,081 | 像16 14和12nm |  |
| 108 | 00:04:26,246 --> 00:04:28,552 | 在两三年之前 |  |
| 109 | 00:04:28,553 --> 00:04:29,468 | 我们有投入到 |  |
| 110 | 00:04:29,752 --> 00:04:31,972 | 台积电的7nm的研发过程当中 |  |
| 111 | 00:04:32,252 --> 00:04:33,892 | 像去年我们已投入完成了 |  |
| 112 | 00:04:33,893 --> 00:04:34,972 | 像5nm的芯片 |  |
| 113 | 00:04:35,112 --> 00:04:36,684 | 我们现在正在开发的 |  |
| 114 | 00:04:36,684 --> 00:04:37,996 | 是3nm的技术 |  |
| 115 | 00:04:39,040 --> 00:04:41,318 | 除了跟我们的 |  |
| 116 | 00:04:41,318 --> 00:04:43,320 | foundry的合作伙伴 |  |
| 117 | 00:04:43,540 --> 00:04:46,040 | 在最先进的工艺节点上面去开发 |  |
| 118 | 00:04:46,080 --> 00:04:47,940 | 我们的IP和测试芯片之外 |  |
| 119 | 00:04:48,160 --> 00:04:50,004 | 我们还会跟我们的 |  |
| 120 | 00:04:50,004 --> 00:04:51,200 | 像TSMC |  |
| 121 | 00:04:51,550 --> 00:04:53,768 | 像先进的封装厂 |  |
| 122 | 00:04:53,880 --> 00:04:56,780 | 共同开发2.5D的封装技术 |  |
| 123 | 00:04:57,000 --> 00:04:58,640 | 做2.5D的封装技术 |  |
| 124 | 00:04:58,700 --> 00:05:00,180 | 它在传统的封装之上 |  |
| 125 | 00:05:00,340 --> 00:05:01,809 | 我们看到它会跟我们的 |  |
| 126 | 00:05:01,809 --> 00:05:03,080 | HBM的DRAM |  |
| 127 | 00:05:03,431 --> 00:05:05,756 | 通过silicon int protos |  |
| 128 | 00:05:05,903 --> 00:05:07,715 | 硅基板的方式把它连接起来 |  |
| 129 | 00:05:08,075 --> 00:05:10,068 | 它所提供的高带宽的memory |  |
| 130 | 00:05:10,175 --> 00:05:11,415 | 远远超过我们的想象 |  |
| 131 | 00:05:11,759 --> 00:05:13,259 | 当前为止其实 |  |
| 132 | 00:05:13,425 --> 00:05:14,905 | 在一些高性计算上面 |  |
| 133 | 00:05:14,906 --> 00:05:17,842 | 像AMD的那些高性能处理器 |  |
| 134 | 00:05:17,842 --> 00:05:19,305 | 或者是GPU上面 |  |
| 135 | 00:05:19,525 --> 00:05:21,921 | 它会使用到类似的技术 |  |
| 136 | 00:05:22,268 --> 00:05:24,930 | 我们的封装技术在国内来说 |  |
| 137 | 00:05:24,931 --> 00:05:26,570 | 其实还有很大的差距 |  |
| 138 | 00:05:26,830 --> 00:05:28,603 | 未来我觉得在三五年之内 |  |
| 139 | 00:05:28,603 --> 00:05:29,630 | 我们要赶上来 |  |
| 140 | 00:05:29,662 --> 00:05:30,882 | 这是一个很好的机会 |  |
| 141 | 00:05:32,237 --> 00:05:34,665 | 除了对先进工艺 |  |
| 142 | 00:05:34,665 --> 00:05:36,660 | 以及先进封装技术之外 |  |
| 143 | 00:05:36,700 --> 00:05:37,893 | 我们更多的储备了 |  |
| 144 | 00:05:37,893 --> 00:05:39,240 | 是我们的一些IP |  |
| 145 | 00:05:39,381 --> 00:05:42,075 | 这些IP也正是我们的 |  |
| 146 | 00:05:42,075 --> 00:05:43,293 | 像数据中心应用 |  |
| 147 | 00:05:43,565 --> 00:05:46,220 | 和高性能的计算芯片所必备的 |  |
| 148 | 00:05:46,500 --> 00:05:47,950 | 包括像memory接口 |  |
| 149 | 00:05:47,950 --> 00:05:49,915 | HBM 3/2E/2的 |  |
| 150 | 00:05:50,278 --> 00:05:51,137 | PHY 跟controller |  |
| 151 | 00:05:51,378 --> 00:05:55,425 | 还有就是LPDDR5/4x |  |
| 152 | 00:05:55,593 --> 00:05:59,540 | 连接的IP包含了D2D |  |
| 153 | 00:05:59,541 --> 00:06:01,120 | 就是D2D的这种IP |  |
| 154 | 00:06:01,462 --> 00:06:03,459 | 也有芯片互联的技术 |  |
| 155 | 00:06:03,459 --> 00:06:04,205 | 叫Interlaken |  |
| 156 | 00:06:04,405 --> 00:06:06,465 | 这是一种非常成熟的技术 |  |
| 157 | 00:06:06,512 --> 00:06:08,025 | 在国际上已经使用很多 |  |
| 158 | 00:06:08,378 --> 00:06:09,805 | 还有部分就以太网 |  |
| 159 | 00:06:10,103 --> 00:06:11,853 | 以太网我们会是从 |  |
| 160 | 00:06:11,853 --> 00:06:14,185 | 10G到800G的以太网 |  |
| 161 | 00:06:14,275 --> 00:06:16,906 | 主要用于骨干网的光通信 |  |
| 162 | 00:06:17,250 --> 00:06:20,165 | 剩下部分是USB的控制器 |  |
| 163 | 00:06:22,012 --> 00:06:24,100 | 我们的业务流程 |  |
| 164 | 00:06:24,100 --> 00:06:25,050 | 从整体上来讲 |  |
| 165 | 00:06:25,051 --> 00:06:26,923 | 涵盖了整个芯片 |  |
| 166 | 00:06:26,923 --> 00:06:30,212 | 从定义到前端设计Architecture |  |
| 167 | 00:06:30,390 --> 00:06:32,775 | 到IP的选型定制 |  |
| 168 | 00:06:32,943 --> 00:06:34,003 | 到软件开发 |  |
| 169 | 00:06:34,330 --> 00:06:35,928 | 到FPGA prototyping |  |
| 170 | 00:06:36,328 --> 00:06:37,440 | 到物理设计 |  |
| 171 | 00:06:37,670 --> 00:06:38,953 | 到verification的制造 |  |
| 172 | 00:06:38,953 --> 00:06:40,210 | 封装 测试 |  |
| 173 | 00:06:40,595 --> 00:06:42,459 | 到圆形芯片的调试 |  |
| 174 | 00:06:42,590 --> 00:06:44,955 | 最终跟客户共同 |  |
| 175 | 00:06:45,115 --> 00:06:48,135 | 把这颗芯片推向量产production |  |
| 176 | 00:06:51,700 --> 00:06:53,480 | 接下来我们要讨论一下 |  |
| 177 | 00:06:53,620 --> 00:06:56,578 | 我们所看到的基于RISC-V的 |  |
| 178 | 00:06:56,781 --> 00:06:57,841 | High Performance Computing |  |
| 179 | 00:06:57,841 --> 00:07:00,256 | 和Data Center应用的一些架构 |  |
| 180 | 00:07:00,662 --> 00:07:03,034 | 这里其实可以看到 |  |
| 181 | 00:07:03,250 --> 00:07:05,370 | 在Data Center的应用当中 |  |
| 182 | 00:07:05,610 --> 00:07:07,709 | 我们能够涉及到的 |  |
| 183 | 00:07:07,910 --> 00:07:09,750 | 一些核心技术的一些演变 |  |
| 184 | 00:07:10,150 --> 00:07:10,956 | 包括了 |  |
| 185 | 00:07:11,156 --> 00:07:13,337 | 它需要一个更强大的CPU |  |
| 186 | 00:07:13,815 --> 00:07:14,881 | 更强的CPU的话 |  |
| 187 | 00:07:14,881 --> 00:07:16,000 | 其实在座的都可以看到 |  |
| 188 | 00:07:16,315 --> 00:07:19,230 | 有一些应用领域上面有特殊的 |  |
| 189 | 00:07:19,231 --> 00:07:20,553 | 或者是通用计算方面 |  |
| 190 | 00:07:20,553 --> 00:07:21,846 | 需要有加强的 |  |
| 191 | 00:07:22,203 --> 00:07:23,550 | 对SiFive来讲 |  |
| 192 | 00:07:23,551 --> 00:07:25,159 | 它可能会有之前的 |  |
| 193 | 00:07:25,159 --> 00:07:27,075 | U7系列升级到U8系列 |  |
| 194 | 00:07:27,221 --> 00:07:29,340 | 甚至在AI方面它会有X系列 |  |
| 195 | 00:07:29,340 --> 00:07:30,810 | 来推向市场 |  |
| 196 | 00:07:31,221 --> 00:07:32,371 | 除此之外 |  |
| 197 | 00:07:32,615 --> 00:07:33,959 | 客户一定会有 |  |
| 198 | 00:07:33,959 --> 00:07:36,035 | 他比较有特殊应用的 |  |
| 199 | 00:07:36,036 --> 00:07:37,643 | 像AI的加速器 |  |
| 200 | 00:07:38,375 --> 00:07:39,693 | 还有它的接口 |  |
| 201 | 00:07:40,015 --> 00:07:41,396 | 接口我们也看到 |  |
| 202 | 00:07:41,396 --> 00:07:43,855 | 从之前的PCle Gen4到Gen5 |  |
| 203 | 00:07:43,855 --> 00:07:44,935 | 现在到Gen6 |  |
| 204 | 00:07:45,331 --> 00:07:46,910 | 国内有很多客户已经 |  |
| 205 | 00:07:47,009 --> 00:07:48,528 | 在使用PCle Gen5 |  |
| 206 | 00:07:48,750 --> 00:07:49,928 | 来设计它的SoC |  |
| 207 | 00:07:50,575 --> 00:07:52,012 | 从网络端的话 |  |
| 208 | 00:07:52,146 --> 00:07:54,490 | 我们会看到从56G bps |  |
| 209 | 00:07:54,530 --> 00:07:56,821 | 一直到现在112G的bps |  |
| 210 | 00:07:57,334 --> 00:07:58,830 | 那是SerDes的技术 |  |
| 211 | 00:07:59,090 --> 00:08:00,690 | 我们国内SerDes技术其实 |  |
| 212 | 00:08:00,690 --> 00:08:03,912 | 还对112G的话还是有 |  |
| 213 | 00:08:04,131 --> 00:08:06,228 | 我觉得应该有三五年的时间 |  |
| 214 | 00:08:06,228 --> 00:08:08,168 | 可能需要成熟 |  |
| 215 | 00:08:08,528 --> 00:08:10,750 | 还有一部分其实蛮重要一点 |  |
| 216 | 00:08:10,751 --> 00:08:12,710 | 就是我们在做 |  |
| 217 | 00:08:12,710 --> 00:08:15,550 | Multi Cluster或者【】的时候 |  |
| 218 | 00:08:15,690 --> 00:08:17,330 | 我们会有一些接口的要求 |  |
| 219 | 00:08:17,331 --> 00:08:18,784 | 就像Low latency的 |  |
| 220 | 00:08:18,784 --> 00:08:20,378 | CXL的这种协议 |  |
| 221 | 00:08:20,687 --> 00:08:22,856 | 那么对于功耗的话 |  |
| 222 | 00:08:22,856 --> 00:08:24,284 | 我们现在也能看到 |  |
| 223 | 00:08:24,556 --> 00:08:27,015 | 当时如果你使用 |  |
| 224 | 00:08:27,015 --> 00:08:28,850 | 很多的高速SerDes的话 |  |
| 225 | 00:08:29,009 --> 00:08:31,268 | 它会对你的整个芯片的功耗 |  |
| 226 | 00:08:31,268 --> 00:08:32,800 | 带来很大的影响 |  |
| 227 | 00:08:33,021 --> 00:08:35,037 | 现在也有一些用 |  |
| 228 | 00:08:35,037 --> 00:08:36,537 | 超低功耗的方式来实现 |  |
| 229 | 00:08:36,800 --> 00:08:39,020 | 包括你可以用chiplets的方式 |  |
| 230 | 00:08:39,220 --> 00:08:40,940 | 包括用并行走线的方式 |  |
| 231 | 00:08:41,140 --> 00:08:43,009 | 可以把你整个芯片的功耗降下来 |  |
| 232 | 00:08:43,965 --> 00:08:46,985 | 还有一项我们比较特殊的地方 |  |
| 233 | 00:08:47,085 --> 00:08:49,643 | 就在于D2D的interface |  |
| 234 | 00:08:50,125 --> 00:08:51,034 | 简称D2D |  |
| 235 | 00:08:51,381 --> 00:08:53,475 | 这里会带来一项新的技术 |  |
| 236 | 00:08:53,828 --> 00:08:55,487 | 我们国内有蛮多的 |  |
| 237 | 00:08:55,487 --> 00:08:56,825 | 客户已经在使用 |  |
| 238 | 00:08:57,537 --> 00:08:58,509 | 叫做chiplets |  |
| 239 | 00:08:59,237 --> 00:09:00,715 | 怎么来看这张图 |  |
| 240 | 00:09:01,031 --> 00:09:02,643 | 这张图我们先从 |  |
| 241 | 00:09:02,993 --> 00:09:05,784 | 它的右上方那段文字去说 |  |
| 242 | 00:09:06,062 --> 00:09:08,830 | 你可能有一颗5nm的 |  |
| 243 | 00:09:08,831 --> 00:09:10,050 | 超大的一颗芯片 |  |
| 244 | 00:09:10,250 --> 00:09:11,396 | 它的面积可能超过 |  |
| 245 | 00:09:11,396 --> 00:09:13,343 | 400个平方毫米 |  |
| 246 | 00:09:13,740 --> 00:09:15,770 | 那有可能到700个平方都有可能 |  |
| 247 | 00:09:16,156 --> 00:09:17,365 | 它所带来的问题是什么 |  |
| 248 | 00:09:17,700 --> 00:09:18,771 | 它会超过你的 |  |
| 249 | 00:09:18,771 --> 00:09:20,696 | 光照生产的reticle size |  |
| 250 | 00:09:21,321 --> 00:09:22,659 | 所以它带来的问题就是 |  |
| 251 | 00:09:22,659 --> 00:09:23,505 | 不能生产 |  |
| 252 | 00:09:23,640 --> 00:09:25,205 | 或者生产良率特别的低 |  |
| 253 | 00:09:25,445 --> 00:09:26,306 | 这是第一个问题 |  |
| 254 | 00:09:26,521 --> 00:09:27,350 | 第二个问题 |  |
| 255 | 00:09:27,585 --> 00:09:30,575 | 它会带来你的IO数量的限制 |  |
| 256 | 00:09:30,731 --> 00:09:32,818 | 你对于这样一个复杂的设计 |  |
| 257 | 00:09:33,125 --> 00:09:34,705 | 你推向市场的速度也会变慢 |  |
| 258 | 00:09:34,906 --> 00:09:38,285 | 如何去解决从一个超大的5nm的芯片 |  |
| 259 | 00:09:38,390 --> 00:09:40,378 | 变成一个IO chiplets |  |
| 260 | 00:09:40,431 --> 00:09:43,420 | 或者是相同芯片的chiplets方案 |  |
| 261 | 00:09:43,556 --> 00:09:44,516 | 有两个选择 |  |
| 262 | 00:09:44,946 --> 00:09:47,175 | 我们看到对AI的应用方面 |  |
| 263 | 00:09:47,381 --> 00:09:49,019 | 客户使用比较多的方案 |  |
| 264 | 00:09:49,246 --> 00:09:51,450 | 是左下角的这个方案 |  |
| 265 | 00:09:51,451 --> 00:09:52,087 | 这张图 |  |
| 266 | 00:09:52,240 --> 00:09:55,556 | 它是用完全相同的架构和芯片 |  |
| 267 | 00:09:55,770 --> 00:09:57,890 | 去做矩阵的互联 |  |
| 268 | 00:09:58,210 --> 00:10:02,350 | 你看到中间的4颗5nm的die |  |
| 269 | 00:10:02,530 --> 00:10:04,725 | 它是一对三 |  |
| 270 | 00:10:04,859 --> 00:10:06,243 | 那有可能你也是可以用 |  |
| 271 | 00:10:06,243 --> 00:10:07,377 | 9颗芯片连起来 |  |
| 272 | 00:10:07,420 --> 00:10:08,465 | 它是一个矩阵的方式 |  |
| 273 | 00:10:08,718 --> 00:10:09,700 | 完全一样的芯片 |  |
| 274 | 00:10:09,920 --> 00:10:11,700 | 但是你可以并行推高你的 |  |
| 275 | 00:10:11,760 --> 00:10:13,600 | 整个封装完成芯片以后的算力 |  |
| 276 | 00:10:14,355 --> 00:10:17,234 | 这是第一种D2D应用 |  |
| 277 | 00:10:17,455 --> 00:10:18,506 | 那还有一种 |  |
| 278 | 00:10:18,506 --> 00:10:20,055 | 就像右下角 |  |
| 279 | 00:10:20,150 --> 00:10:22,010 | 它是一种用IO chiplets的方式 |  |
| 280 | 00:10:22,291 --> 00:10:24,493 | 像AMD的【】 |  |
| 281 | 00:10:24,493 --> 00:10:25,656 | 和【】这种架构 |  |
| 282 | 00:10:25,656 --> 00:10:26,855 | 他们用的是这种方式 |  |
| 283 | 00:10:27,435 --> 00:10:29,689 | 它可能是周边一圈是 |  |
| 284 | 00:10:29,689 --> 00:10:30,855 | CPU的处理器 |  |
| 285 | 00:10:31,015 --> 00:10:33,396 | 中间就是一个高速接口 |  |
| 286 | 00:10:33,965 --> 00:10:34,850 | 的chiplets |  |
| 287 | 00:10:35,515 --> 00:10:37,190 | 在网络通信方面 |  |
| 288 | 00:10:37,310 --> 00:10:38,084 | 反过来做 |  |
| 289 | 00:10:38,321 --> 00:10:40,210 | 中间是一个主处理芯片 |  |
| 290 | 00:10:40,456 --> 00:10:41,609 | 四周都是高速的 |  |
| 291 | 00:10:41,609 --> 00:10:43,184 | 56G或112G SerDes |  |
| 292 | 00:10:43,615 --> 00:10:45,121 | 所带来的好处就是 |  |
| 293 | 00:10:45,270 --> 00:10:46,710 | 我的IO的扩展性非常好 |  |
| 294 | 00:10:46,711 --> 00:10:49,096 | 而且我的IO chiplets做完一次之后 |  |
| 295 | 00:10:49,270 --> 00:10:51,175 | 我未来可以多个项目去复用它 |  |
| 296 | 00:10:51,831 --> 00:10:54,238 | 这就是IO chiplets给我们带来的好处 |  |
| 297 | 00:10:54,940 --> 00:10:57,306 | 那接下来看openfive本身 |  |
| 298 | 00:10:57,306 --> 00:10:58,390 | 在这样一个方案基础上 |  |
| 299 | 00:10:58,391 --> 00:10:59,310 | 已经带来了什么 |  |
| 300 | 00:10:59,310 --> 00:11:01,115 | 主要是几个 |  |
| 301 | 00:11:01,115 --> 00:11:03,590 | 第一个是你看到绿色部分 |  |
| 302 | 00:11:03,990 --> 00:11:05,650 | 这框图里面绿色部分这些IP |  |
| 303 | 00:11:05,651 --> 00:11:06,796 | 包括接口IP |  |
| 304 | 00:11:06,796 --> 00:11:07,650 | 包括Trace Debug |  |
| 305 | 00:11:07,651 --> 00:11:09,403 | 包括SiFive的CPU |  |
| 306 | 00:11:09,603 --> 00:11:10,778 | 包括高速SerDes |  |
| 307 | 00:11:10,928 --> 00:11:12,470 | 以及D2D和memory接口 |  |
| 308 | 00:11:12,790 --> 00:11:15,046 | 客户所需要提供的就是一个 |  |
| 309 | 00:11:15,046 --> 00:11:15,875 | 蓝色模块 |  |
| 310 | 00:11:16,050 --> 00:11:17,821 | 你所定制的你做差异化的 |  |
| 311 | 00:11:17,821 --> 00:11:19,090 | 一个模块 |  |
| 312 | 00:11:19,091 --> 00:11:20,430 | 包括AI加速等等 |  |
| 313 | 00:11:22,275 --> 00:11:25,621 | 我们所准备好的这些IP和技术 |  |
| 314 | 00:11:25,830 --> 00:11:27,190 | 可以分四大类 |  |
| 315 | 00:11:27,230 --> 00:11:29,270 | 第一大类 像连接类的 |  |
| 316 | 00:11:30,950 --> 00:11:32,609 | 以太网400G 800G的 |  |
| 317 | 00:11:33,100 --> 00:11:35,756 | 像前向纠错FEC FlexE |  |
| 318 | 00:11:35,870 --> 00:11:37,481 | 还有是超低延时的 |  |
| 319 | 00:11:37,481 --> 00:11:39,465 | Chip2Chip的Controller |  |
| 320 | 00:11:39,853 --> 00:11:42,070 | 中间部分就是memory接口 |  |
| 321 | 00:11:42,310 --> 00:11:44,603 | 我们看到像HBM和DDR的 |  |
| 322 | 00:11:44,996 --> 00:11:46,845 | 在Chiplets的方案方面 |  |
| 323 | 00:11:46,885 --> 00:11:49,015 | 除了我们使用很多的 |  |
| 324 | 00:11:49,059 --> 00:11:52,125 | 像D2D的PHY和Controller之外 |  |
| 325 | 00:11:52,306 --> 00:11:53,081 | 还有就是 |  |
| 326 | 00:11:53,278 --> 00:11:55,365 | 当前的数据中心里面已经有 |  |
| 327 | 00:11:55,405 --> 00:11:56,234 | 蛮多趋势 |  |
| 328 | 00:11:56,234 --> 00:11:57,605 | 就是基于以太网技术的 |  |
| 329 | 00:11:57,806 --> 00:11:58,591 | 这种chiplets |  |
| 330 | 00:11:59,790 --> 00:12:01,256 | 还有一些就是 |  |
| 331 | 00:12:01,256 --> 00:12:03,035 | 在超大芯片实现过程当中 |  |
| 332 | 00:12:03,275 --> 00:12:05,003 | 你不可避免的 |  |
| 333 | 00:12:05,015 --> 00:12:06,868 | 你需要用一个定制的SRAMs |  |
| 334 | 00:12:07,215 --> 00:12:08,821 | 去来得到更好的PPA |  |
| 335 | 00:12:09,321 --> 00:12:11,685 | 包括一些特殊的PLLs DLLs等等 |  |
| 336 | 00:12:13,040 --> 00:12:15,890 | 这个是我们在2.5D的 |  |
| 337 | 00:12:15,890 --> 00:12:17,090 | 封装技术方面 |  |
| 338 | 00:12:17,390 --> 00:12:18,330 | 我们所积累的 |  |
| 339 | 00:12:18,370 --> 00:12:19,584 | 六七年的时间 |  |
| 340 | 00:12:19,584 --> 00:12:20,810 | 所沉淀下的技术 |  |
| 341 | 00:12:21,070 --> 00:12:22,675 | 包括你在使用 |  |
| 342 | 00:12:22,675 --> 00:12:25,384 | HBM的PHY和HBM的DRAM |  |
| 343 | 00:12:25,525 --> 00:12:27,345 | 用作2.5D封装时候 |  |
| 344 | 00:12:27,550 --> 00:12:29,130 | 你整个不同流程打通 |  |
| 345 | 00:12:29,131 --> 00:12:30,390 | 这是相当复杂的过程 |  |
| 346 | 00:12:30,821 --> 00:12:32,104 | 都是专业的公司来做 |  |
| 347 | 00:12:32,471 --> 00:12:35,125 | 看到我们的HBM2从 |  |
| 348 | 00:12:35,185 --> 00:12:37,825 | 最早的55nm一直到现在的5纳米 |  |
| 349 | 00:12:38,028 --> 00:12:40,428 | 每一年甚至一代两代的演进 |  |
| 350 | 00:12:40,645 --> 00:12:43,885 | 在HBM3标准确立之前 |  |
| 351 | 00:12:44,084 --> 00:12:45,534 | 我们已经在做测试芯片 |  |
| 352 | 00:12:45,825 --> 00:12:47,093 | 等到标准一旦确立 |  |
| 353 | 00:12:47,093 --> 00:12:48,725 | 我们就可以推向给客户使用 |  |
| 354 | 00:12:49,296 --> 00:12:50,170 | 所以你看到 |  |
| 355 | 00:12:50,230 --> 00:12:51,543 | 我们现在做了一些芯片 |  |
| 356 | 00:12:51,543 --> 00:12:53,130 | 的右下角的尺寸 |  |
| 357 | 00:12:53,306 --> 00:12:55,190 | 封装球数将近3000个 |  |
| 358 | 00:12:55,510 --> 00:12:56,390 | 大的SoC |  |
| 359 | 00:12:56,390 --> 00:12:58,209 | 是650个平方毫米 |  |
| 360 | 00:12:58,521 --> 00:13:00,556 | 它下面还有Stitched Interposer |  |
| 361 | 00:13:00,830 --> 00:13:02,430 | 要将近1000个平方毫米 |  |
| 362 | 00:13:02,510 --> 00:13:03,810 | 是非常非常大的芯片 |  |
| 363 | 00:13:05,760 --> 00:13:06,620 | OK 好 |  |
| 364 | 00:13:06,668 --> 00:13:09,287 | 这里是我们刚刚taped的一颗 |  |
| 365 | 00:13:09,656 --> 00:13:10,800 | 基于RISC-V的 |  |
| 366 | 00:13:11,085 --> 00:13:12,305 | 未来用于高性能 |  |
| 367 | 00:13:12,462 --> 00:13:14,685 | HPC计算的7nm的芯片 |  |
| 368 | 00:13:14,686 --> 00:13:15,665 | 台积电7nm芯片 |  |
| 369 | 00:13:15,905 --> 00:13:18,005 | 里面包含的核心技术包括了 |  |
| 370 | 00:13:18,225 --> 00:13:19,685 | 我们的D2D的子系统 |  |
| 371 | 00:13:19,905 --> 00:13:21,045 | Chip-to -Chip的子系统 |  |
| 372 | 00:13:21,140 --> 00:13:22,309 | 还有LPDDR |  |
| 373 | 00:13:22,309 --> 00:13:24,760 | 以及一颗用于通用计算的 |  |
| 374 | 00:13:24,793 --> 00:13:26,305 | RISC-V64位处理器 |  |
| 375 | 00:13:26,940 --> 00:13:28,750 | 等芯片回来之后 |  |
| 376 | 00:13:28,880 --> 00:13:31,000 | 我们会用台积电比较先进的2.5D的 |  |
| 377 | 00:13:31,060 --> 00:13:34,300 | inFO\_oS的封装方式去做封装测试 |  |
| 378 | 00:13:36,859 --> 00:13:40,210 | 我们在这里再重新回顾一下 |  |
| 379 | 00:13:40,310 --> 00:13:41,790 | 你需要做一颗 |  |
| 380 | 00:13:41,850 --> 00:13:42,668 | 高性能计算 |  |
| 381 | 00:13:42,668 --> 00:13:44,384 | 或者数据中心应用的SoC |  |
| 382 | 00:13:44,590 --> 00:13:46,068 | 它所需要具备的 |  |
| 383 | 00:13:46,068 --> 00:13:47,410 | 哪些基本条件 |  |
| 384 | 00:13:47,670 --> 00:13:49,856 | 包括一个 |  |
| 385 | 00:13:49,856 --> 00:13:51,970 | 像select input的设计能力 |  |
| 386 | 00:13:51,971 --> 00:13:52,870 | 联合仿真能力 |  |
| 387 | 00:13:52,871 --> 00:13:55,690 | 包括Power和Signal Integrity |  |
| 388 | 00:13:55,770 --> 00:13:57,090 | 还有是热仿真能力 |  |
| 389 | 00:13:57,230 --> 00:13:58,803 | 包括你的封装基板的 |  |
| 390 | 00:13:58,803 --> 00:14:00,870 | 翘曲的仿真 |  |
| 391 | 00:14:00,871 --> 00:14:02,043 | 都是非常重要的技术 |  |
| 392 | 00:14:02,537 --> 00:14:04,262 | 它能保证你的产品 |  |
| 393 | 00:14:04,262 --> 00:14:05,835 | 能够成功推向量产 |  |
| 394 | 00:14:06,037 --> 00:14:08,075 | 还有一个你需要具备 |  |
| 395 | 00:14:08,112 --> 00:14:09,725 | 除了2.5D封装技术之外 |  |
| 396 | 00:14:09,928 --> 00:14:11,275 | 你可能要更多的是 |  |
| 397 | 00:14:11,595 --> 00:14:13,295 | 去积累你的测试的方式 |  |
| 398 | 00:14:13,575 --> 00:14:16,028 | 测试在2.5D方面也是非常的 |  |
| 399 | 00:14:16,428 --> 00:14:18,134 | 很有挑战 |  |
| 400 | 00:14:18,525 --> 00:14:19,520 | 我们再看一下 |  |
| 401 | 00:14:19,768 --> 00:14:22,454 | 我们现在来讨论的东西 |  |
| 402 | 00:14:22,615 --> 00:14:24,053 | 跟我们中国 |  |
| 403 | 00:14:24,315 --> 00:14:26,206 | 本土的企业正在做的 |  |
| 404 | 00:14:26,365 --> 00:14:28,120 | RISC-V是否是有相关性 |  |
| 405 | 00:14:28,380 --> 00:14:31,440 | 我想我今天可以回答一些问题 |  |
| 406 | 00:14:31,560 --> 00:14:32,615 | 不过时间有限 |  |
| 407 | 00:14:32,725 --> 00:14:33,996 | 但是我不能回答 |  |
| 408 | 00:14:34,220 --> 00:14:35,083 | 今天上午 |  |
| 409 | 00:14:35,083 --> 00:14:38,920 | 戴博士在那边做了一个调查 |  |
| 410 | 00:14:38,921 --> 00:14:40,075 | 就是英特尔 |  |
| 411 | 00:14:40,075 --> 00:14:42,012 | 会不会收购SiFive成功 |  |
| 412 | 00:14:42,012 --> 00:14:44,960 | 这里有很多比例我记得是 |  |
| 413 | 00:14:45,162 --> 00:14:47,220 | 64.7%的人认为 |  |
| 414 | 00:14:47,260 --> 00:14:49,100 | 英特尔能够成功的收购SiFive |  |
| 415 | 00:14:49,846 --> 00:14:51,296 | 我没有投票 |  |
| 416 | 00:14:51,531 --> 00:14:52,880 | 我不能投票是吧 |  |
| 417 | 00:14:53,043 --> 00:14:54,690 | 有没有问题想问的 |  |
| 418 | 00:14:54,690 --> 00:14:56,000 | 很简单的问题 |  |
| 419 | 00:14:56,196 --> 00:14:57,570 | 我可以回答一下 |  |
| 420 | 00:14:59,909 --> 00:15:01,109 | 如果没有的话 |  |
| 421 | 00:15:01,109 --> 00:15:02,882 | 就到我们那个展位上 |  |
| 422 | 00:15:02,882 --> 00:15:03,470 | 好不好 |  |
| 423 | 00:15:03,670 --> 00:15:04,430 | 谢谢 |  |